IDENTIFYING INDUSTRY DEFINED BEST PRACTICES WITHIN EDUCATIONAL YOUTUBE CONTENT, AN EXPLORATORY STUDY

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Martin van der Kroon

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1.1 Statement of the Problem and Goals of the Research

Academia has been a cornerstone of western civilization, harboring and safekeeping invaluable amounts of knowledge and educating generation after generation of the populous. The importance of academia in society becomes clear when we realize how much emphasis is placed on education when it comes to job, income opportunities, and social status. According to a 2012 report from the U.S. Department of Education between 2002 and 2012 the enrollment in degree-granting institutions rose 4% to 20.6 million students, while at the same time the total population increased by 10% from 287.63 million (U.S. Census Bureau, 2004) to 314.11 million in 2012. This shows that population growth far outgrew the number of students enrolled.

For hundreds of years academia has had time to mature, and establish methods of operations. This is, however, also the downside as it functions similar to many matured corporations, where policies, protocols, and control procedures are implemented to safeguard a corporation's continued existence in favor of versatility and adaptability. For a long time this didn't seem much of a problem, or perhaps was not even noticed too much as most of the world did not move at such a fast pace either. This has drastically changed in the last decade.

According to Kellner & Kim ". . . the Internet provides individuals today with a whole new pedagogical setting: decentralized and interactive communication, a participatory model of pedagogy, and an expanded flow of information, thus comprising a new field for the conjuncture of education and democracy" (2010, p. 15). The availability of and access to a relatively affordable internet, combined with visionaries and companies creating products and services on and for the internet, has tremendously increased dissemination of information. This has helped

individuals and companies alike research faster, whether it is helping a teenager in researching an essay, or a startup company with their "revolutionary" idea. Google, for example, publishes research papers done in the company. John Giannandrea, Google Vice President of engineering overseeing research and machine intelligence says, "I think the cycle time between a paper being published and something being in a product is probably shorter now than it historically has been" (Simonite, 2015). Not only has it become easier to share information, it has also become much easier to use and process information. Whereas the completion of the first sequencing of the human genome took two competing teams of researchers almost 13 years (Liou, 2010; NIH, 2010), today online services (cloud services) such as Google Genomics (2015) can now process hundreds of human genomes in minutes. These services are now available to everyone having access to internet.

The rise of social media such as Facebook, Twitter, and YouTube a.o., are giving people more options to interact, to share knowledge and information faster and over greater distances. Pietrobruno (2013) illustrates the importance of YouTube for archiving the intangible. UNESCO has made efforts to archive the immaterial cultural heritage of the world such as dance, rituals, oral languages, festivals, ceremonies, and embodied knowledge. Since there is such a vast body of intangible cultural heritage, UNESCO realized the value of user generated content, and started collaborating with YouTube to find and index instances of intangible cultural heritage recorded and uploaded by YouTube users. An illustration that shows the reality of how fast information can be disseminated across the world via use of social media is that of the professional news and journalism business using Twitter, who publish the latest breaking news on Twitter first before any other news outlet (MacMillan, 2013). The interactions on social media, giving the possibility for people to connect across the world, has also changed, and this has helped shape individuals

and cultures. According to Bouvier ". . . these new forms of communication are fused into wider patterns of changing cultural values about forms of social structure, knowledge itself and the kinds of issues that tend to form our individually civic spheres" (Bouvier, 2015, p. 149). The increased speed of information dissemination, communication, and interactions also influences our expectations as we come to expect instant gratification, becoming perpetually impatient (Muther, 2013).

The industry is outpacing academia in advancement by forfeiting much research in favor of practical testing. Adami did novel research on the topic of (then) recently released feature, video responses on YouTube (2009); less than four years later this feature was retired (YouTube Team, 2013). New features are quickly adopted and deployed by early adopters in the Information Communication Technology sector (ICT), and can just as quickly be retired, discarded, updated or replaced (Rogers, 2010). A clear example of replacing or updating a feature is what happened with the automatically generated YouTube #Education channel while this research was well underway. YouTube changed the #Education channel from #Education to 'Science & Education' and with this also retired the # (hashtag) previously used to denote auto-generated YouTube channels (YouTube [1], 2015). Testing is often done via trial and error approaches, using a democracy where users or consumers decide what works. For example, this can be seen on YouTube where people with seemingly little to no formal knowledge regarding the media industry or expertise such as public speaking became famous by communicating messages in a way viewers appreciated. Among the more well-known origin stories of a famous YouTuber is that of makeup tutorial creator Michelle Phan (Faw, 2014), who was a waitress when she started her YouTube channel 6 years ago, and now has a personal worth of 84 million dollars, her own makeup line, as well as having built a $500 million company (Robehmed,

2015). Another example is that of Ray William Johnson, who began his YouTube comedy channel '=3' (pronounced 'equals three') in his college dorm, and now produces multiple YouTube shows and movies, attributing his success to "consistency, being loyal to your audience and giving them what they want . . . really feeling out their needs . . . so they enjoy watching the most" (Cosme, 2011).

Every industry has its success stories, and there are many YouTubers who will never see fame even remotely like makeup guru Michelle Phan or comedian Ray William Johnson. However, the industry of online video content creation, whether speaking about hobbyists, professionals, or simply family and friend videos, is nevertheless sizable. YouTube alone has more than 1 billion users, some of these people are 'prosumers' (Toffler, 1980), consuming as well as producing video content for YouTube (Berrocal, Campos-Dominguez, & Redondo, 2014). Berrocal et. al. conclude, however, that people consume much more video content then they produce (2014). Similarities can be observed between YouTube and Wikipedia regarding consumption and production of content (Wikipedia, 2015). YouTube has a reported value of $70 billion dollars (Hamedy, 2015), localized in 75 countries and translated into 61 languages with half of its users viewing on mobile devices, and more than 300 hours of video uploaded every minute (YouTube [2], 2015). Despite YouTube being the largest host of online video content, there are other similar services such as Vimeo, Yahoo Screen, and Vessel, among many others. These hosts of online video content enable people to express and exchange their ideas openly, within the confines of the service policy, and come to a consensus in the public sphere, in which there is limited interference to express ideas (Habermas, 1991).

Michelle Phan creates makeup tutorials and Ray William Johnson is in comedic entertainment, but there are also quite a few content creators who focus on educational content.

Some of these educational content creators have massive audiences (subscribers) reaching millions of viewers. Some of this educational content is specific to one field of science or art, but many seem to alternate between and bridge multiple disciplines.

Many successful videos include educational content; the latter of particular interest to me as a teacher and technophile, but there is little academic knowledge on how to make such successful videos. It is here that I believe academia can learn from struggles and trial and errors of the community of online video content creators. As a researcher I am interested in improving my understanding as to what the best practices that content creators of educational content use in their video content. Do the norms used in online video content align with or differ from those used in public speaking? Is the compartmentalization that is present in academia between branches of science and the arts also as strongly present in the works of online video content creations? I do not seem to be alone in raising these types of questions regarding online educational or instructional video content. It seems timely, perhaps a zeitgeist of sorts, that two researchers (ten Hove, 2015) from the University of Twente published their paper earlier this year asking a very similar question to my own; 'What Characterizes YouTube's More Popular Instructional Videos?' It is, however, not the only study that explores the options and opportunities to utilize YouTube for educational purposes, or relate it to academia. Bouvier (2015) essentially argues for that which is a limiting factor in this research, namely that academia is only beginning to turn its attention to social media as a whole, including YouTube. Molyneaux & O'Donnell state that, "User-generated video on YouTube is just beginning to be examined by scholars" (2008, p. 3). This is unfortunate because "as a communicative medium, YT (YouTube) is a potential exemplar of the Deweyan pedagogy of learning as communication" (Kellner & Kim, 2010, p. 27).

The goal of this project is to analyze educational YouTube content and identify those elements that help convey information effectively; in essence to try to uncover best practices as found and defined by the YouTube content creation industry (from here on referred to as industry). This can range from time, to requests for interaction, the use of visuals or video aids within the video, as well as how often video frame cuts where two separate video frames are connected to create a transition are used.

Educational YouTube content is deliberately created to transfer knowledge from a host to an audience, the viewer of the video. In this regard is has a clear overlap with public speaking, which is, the art of orally performing a presentation or speech in a live setting from one person to an audience with the intent of informing, persuading, or entertaining. Even though the host is not speaking directly to the audience, but instead via video, there still needs to be a clear understanding of how to connect with the audience through the message.

1.2 Review of the Literature

1.2.1 History, revolutions, and wishful thinking

The way people are educated has remained the same for a long time. Students are situated in a classroom or lecture hall, and a teacher, lecturer, or professor disseminates information to the students. That one person conveys information to many is the current economic model for most publicly available types of education. Similarly much of mass media communication theory is based on assumptions of a one-way flow of information, as seen in the early propaganda-based models proposed by Herman & Chomsky (2010). Criticism of this model, for both communication generally (Peters, 2012) and pedagogic communication specifically, that it maintains hierarchical power differentials and promotes rigid conformity (Freire, 2000). Seen from the mathematical theory of communication by Shannon & Weaver (2015), the expert is

considered the sender of the message, sending this towards the students, who are the receivers of the message. The message, we assume, will be some form of knowledge that is conveyed. A classroom setting of sorts assists in minimizing impediments such as: 'noise', surrounding sounds, visuals, and interactions with those not directly involved in the communication process between sender and receiver.

Another perspective to view this from is economics (Robst, 2001). To have a classroom filled with students and one teacher is cost effective. This as opposed to a teacher for each student which is more costly per individual taught. Even though this could make education fairly affordable, some people have seemingly envisioned more cost-efficient methods with a wider reach that go beyond that of the classroom. French artist Villemard created a set of images in 1910 of what he envisioned the world would look like in the year 2000. One of the depictions shows how students are fed knowledge via ground up books which are delivered directly into the brain (Villemard, 1910). Thomas Edison stated in 1922, "I believe the motion picture is destined to revolutionize our educational system and that in a few years it will supplant largely, if not entirely, the use of textbooks" (Monke, 2004). The same predictions were made about different technologies, such as radio, and television, yet most education is confined to schooling and occurs as part of job training or transferring knowledge within established value systems (Kellner & Kim, 2010) and still occurs in a classroom setting with students and a teacher. One aspect these visionaries did seem to agree upon, that self-actualization as the goal of educational cannot be contained within a classroom (Rousseau, 1979; Dewey, 1916).

The focus has primarily been on cost-effectiveness and reach, or accessibility. If education were merely about transferring information, then reach and accessibility would be the most pressing issues. The problem with proposed revolutionary methods of education such as

radio transmission or television broadcasts has been the lack of student engagement, which is inherently a result of the one-way flow of information. According to Bomia et al. student engagement is a "student's willingness, need, desire and compulsion to participate in, and be successful in, the learning process promoting higher level thinking for enduring understanding" (Bomia, Beluzo, Demeester, Elander, Johnson, & Sheldon, 1997, p.3). Although using technology exclusively for education has so far not provided much success. This does not mean technology cannot facilitate or contribute to student engagement. Research shows that technology can enhance learning outcomes and student engagement via active learning, which is associated with improved academic performance (Hake, 1998; Knight & Wood, 2005; Freeman, et al., 2007; Chaplin, 2009). The increased engagement creates more positive attitudes regarding education and knowledge acquisition (Moravec, Williams, Aguilar-Roca & O'Dowd, 2009).

1.2.2 The Use and Importance of the Internet

As of 2014, 87% of U.S. adults state that they use the internet (Fox & Rainie, 2014). The National Center for Education Statistics (NCES) (U.S. Department of Education, 2010) reported that in 2009, 94% of teachers used the internet in some capacity for instructional purposes or classroom preparation. According to Child Trends Data Bank (2013), 58% of children ranging between 3 and 17 years old use the internet on a daily basis, an increase from 11% in 1997. The Pew Research Center researched teenagers between the ages of 13 and 17, and concluded that a full 92% percent of teenagers go online daily, with 24% of them online almost constantly, while 56% go online multiple times a day (Lenhart, 2015). Something teachers may not be aware of is that those children who are constantly online, and even those multiple times a day, are likely to go online the moment they are outside of the classroom, perhaps even when visiting the sanitary facilities. Although most of the time spent online by teenagers is dedicated to social media, it

shows what an integral part the internet is becoming in the lives of children, teenagers, and our future adults.

The need to have internet access to effectively study is becoming widely accepted as a necessity within academia and high school (Chen, 2014). This ranges from research for essays and papers, to speeches and presentations. It is evident that the technological advancements that mankind is making, especially with the internet, have given rise to more options and opportunities to share information, as well as to educate. From technologies such as radio, television, and VHS, to the use of email, social media, and MOOCs (Massive Open Online Course) such as Coursera and MIT Opencourseware, we can observe how much the landscape of education is diversifying when it comes to the medium of instruction delivery used. For a time the use of high bandwidth methods, such as video, were limited due to slow internet speeds. This is, however, decreasing as an issue, at least in the western world. Another important factor for the widespread availability of video is the cheap, or free, editing software, as well as relatively high quality and low cost video equipment. To exemplify the decreased cost and increased quality of video equipment, it may be observed that in 2000 a 3.34 Megapixel Canon G1 camera cost $800, in 2010 one could buy a Canon Powershot A480 camera with 10 megapixels, and overall higher specifications for $110, or a High Definition recording camera for $800 (Herman, 2010). Most smartphones now come equipped with cameras that easily produce a higher detail image with more megapixels than the earlier mentioned Canon G1 or Canon Powershot A480 (Martin, 2015). Furthermore there are a multitude of video sharing sites such as YouTube, Vimeo, Vessel, etc. which make it easy for content creators to edit and upload their videos. This can be seen in the statistics of YouTube usage, where in 2012, 72 hours of video content was uploaded per minute (Kosner, 2012). In 2013 it was more than 100 hours of video content per

minute (Russell, 2013), and in 2015 it is more than 300 hours of video per minute (YouTube [1], 2015). Among these many hours are not only cat videos and the next viral video, but also educational content. As the barriers to access information lowers, so do the barriers between fields of research, and inversely, the sharing of knowledge seems to increase within academia as interdisciplinaries become more popular.

1.2.3 Interdisciplinarity

Interdisciplinary studies are gaining popularity and have spawned their own field of research, namely, the study of Interdisciplinarity. Interdisciplinarity focuses on researching techniques to effectively and cohesively integrate multiple, often particular parts of, different fields of study and research. According to Newell (2001) "interdisciplinary study draws insights from relevant disciplines and integrates those insights into a more comprehensive understanding."

Something that is changing within education is the compartmentalization of various fields of study and research. Perhaps more accurately, the metaphorical walls between fields of study and research are starting to disappear as academia is becoming more aware that different fields of study and research are inextricably intertwined with each other. Klein (1990) concludes that, "Very often disciplinary interactions are also the inevitable result of the broadening of disciplines, . . . from a monistic to a pluralistic perspective" (p.46). The necessity of interdisciplinarity arises as systems become more complex, consisting of multiple, often non-hierarchical, systems being non-linearly connected, and at times having incompatible subsystems (Newell 2001, Klein & Newell 1996).

Educational content creators, some who may do this as a hobby or out of passion for their speciality or expertise, now create content specifically for online video sharing sites such as

YouTube. Classroom recordings can be uploaded, but are not specifically created with online video sharing in mind since the primary focus is on the classroom. As this educational content is not bound or confined to the structure and taxonomies of educational institutions, they often incorporate knowledge from various fields, encouraging an interdisciplinary approach. While interdisciplinarity is valuable as it reaches academic content, it becomes complicated as it reaches video content. The interdisciplinarity of educational content online makes it harder, perhaps impractical, to categorize the educational content into one familiar category. Therefore categories such as mathematics, physics, biology, or psychology become irrelevant.

Newell et al. (1996) state that the reason for change into a more interdisciplinary approach is knowledge itself. The disciplinary boundaries are blurring and the cross-fertilization and the borrowing of methods and concepts is becoming more commonplace, creating knowledge that is heterogenous, complex, and hybrid in nature (Easton and Schelling, 1991; Gibbons, Limoges, Nowotny, Schwartzman, Scott, & Trow, 1994). The internet is probably also the most well-known example of a complex system, consisting of heterogeneous and hybridized knowledge and information (Park & Willinger, 2005). The rise of the internet has given people the ability to make sharing information easier and faster across distances, to form collaborations within and across disciplines. Even though the sharing of information by means of technology has become easier, this does not mean that communication has become easier. It might well be argued that communication has become more complicated as new modes of communication require new rules of engagement and interaction between people in order to understand one another correctly. Perhaps the clearest illustration of such is the 'text message.' The text message has increased our ability to share information, yet many miscommunications arise as a result of

misinterpretations of intent. These miscommunications via newer forms of media can even damage relationships (Gunther, 2011).

1.2.4 Engagement and Stimuli

Many changes in methods and styles of education have been created and proposed, some significantly altering the way the goal and function of education is perceived. Prior to the 1970's students who dropped out of college were seen as weak of character, or showed lack of perseverance, or not intelligent enough to obtain a college degree. Research primarily performed in the 1970's and 1980's by Alexander Astin, Ernest Pascarella, and Patrick Terenzini, showcased the importance of student involvement to the learning outcomes of students and student retention (Astin, 1975, 1984; Endo & Harpel, 1982; Pascarella, 1980; Pascarella & Chapman, 1983; Pascarella & Terenzini, 1980; Terenzini, Lorang, & Pascarella, 1981). Much research has been done on the effects of student engagement and the correlation with the success of students in learning (Astin, 1984; Berger and Milem, 1999; Kuh, Cruce, Shoup, Kinzie, & Gonyea, 2008). Muller (2012) states that just merely explaining something concisely to students is not always effective. He says that students who have to engage more actively to process the information presented actually have a better learning outcome.

Dwyer Jr. (1968) concluded that students who received oral instruction with visual aids accompanying the oral instructions scored higher on a test given after the instruction with visual aids versus students who only received oral instruction. Public speaking classes for decades since that time have incorporated this finding by requiring one or more speech to be accompanied by visual aids. He does, however, note that different types of visual aids can have varying results, for example black and white images, color images, detailed versus abstract images.

Many studies have concluded that the recall of information can be greatly improved by using visual aids. Verdi, Johnson, Stock, Kulhavy, and Whitman-Ahern (1997) concluded that students who are shown visual aids with the accompanying text recalled more information than those students who were given only the text. Schacter (2008) notes that visual aids are concrete objects which are easier to remember (illustrations, icons, logos, etc.) compared to a text which is more abstract and thus harder to process.

Information density is another process that can be relatively hard to process for the brain (Russell, 1984). Not only can information be difficult to remember, it can also be misremembered. With information density often comes higher citation density, as one will attribute the source of the information to the author. The attribution can be as simple as "Einstein helped invent the atomic bomb," although ideally it would include a date, and perhaps a place or for whom.

1.2.5 Best Practices

Best practices in YouTube videos often come to be after experimentation. A content creator might try something new, and depending on viewer feedback, continue to use it. Not only do content creators experiment with new ways of delivering a message or content, but they also copy from one another. An example of this on YouTube is the 'jump-cut,' a cut within the video where the camera is kept stationary and fixed on the same location, but the host changes position, creating a jump of where the host is located on screen. Among the first to popularize this way of recording content was Ray William Johnson with his '=3' show. Other shows began to utilize this method too, such as PBS Idea Channel, which stated that it has been inspired, in part, by the '=3' show despite producing entirely different content (PBS Idea Channel, 2012).

1.2.6 Contemporary Research

More contemporary research regarding YouTube was disclosed. This research, however, was found after my research was well underway. As such, the research could no longer be incorporated into my own. Nevertheless, it is important to highlight this contemporary research.

The research from ten Hove and van der Meij briefly mentioned previously has very similar research goals to this research (2015). The researchers investigate the characteristics that attribute to the success of an instructional video. They reviewed 250 videos for declarative knowledge development, and from this selected a sample of 75 videos based on popularity type and type of declarative knowledge. Their conclusion is that more popular instructional videos differ from less popular instructional videos in characteristics. Ten Hove and van der Meij observe that popular videos are different in the following ways, having higher resolution uploaded videos, more frequent static visual aids, a more frequent combination of static and animated visual aids, more short on-screen texts, more available subtitles, more frequent background music, less background noise, and a faster speaking rate.

1.3 Tentative hypotheses

This research is of an exploratory nature, utilizing the professional world rather than academia as a starting point. It is thus not clear what results might be uncovered in this research, and as such there is no strictly defined research question. Instead, a set of hypotheses of outcomes that might be observed are presented. The list of hypotheses is as follows;

The first and last minute of videos have more cuts than the main body of the video, showing a parallel to the ways in which speeches have introductions and conclusions.

A majority of videos will contain entertaining elements, showing that the use of humor within education may transfer to educational YouTube content.

There is a correlation between duration of a video and the number of likes and dislikes. Shorter videos will receive more likes and less dislikes as people will appreciate conciseness and brevity of videos.

A correlation could exist between presentation type and video frame cuts, where the video frame cuts are higher in videos using a presenter as opposed to a narrator because more video takes will be recorded for a scene, whereas with narrator only audio frame cuts have to be made which is not accounted for within this video.

Speech type is proportionally correlated to likes, and dislikes showing that viewers give preference to ceremonial (entertaining) speech type videos.

2.0

Research Methodology

The purpose of this study was to understand what educational content creators do within their videos that may be described as 'best practices.' In order to achieve this I engaged in quantitative content analysis, utilizing a codebook on the videos reviewed. The gathered data was analysed using Pearson's chi-square statistical hypothesis test, using the 'goodness-of-fit' approach. In order to ensure the reliability of the analysis, a research volunteer interrater reliability testing was done on two of the reviewed videos. The results of the reliability testing were compared to the original results using Cohen's Kappa. In case of significant difference, the coding was adapted and the reliability testing repeated using two different videos.

2.1 Theoretical Framework

The research methodology is content analysis, which came in large part from the work of Alfred Lindesmith in 1931 where he defined the hypothesis known as "The Constant Comparative Method of Qualitative Analysis" (Glaser & Strauss. 1965), and upon which most other research regarding content analysis is based. This is not to be confused with a paper which Glaser and Strauss published in 1965, in which they suggest a new approach to qualitative data analysis. Weber (1990) defines content analysis as ". . . a research technique that uses a set of procedures to make valid inferences from text"(p. 9) but which appears to limit content analysis to textual forms. Here the word 'text' should perhaps be taken in the broader context as a form message, a definition Neuendorf (2002) uses without limiting the methodology to text per se, thus opening up the possibility of more broadly defined messages to media such as video and audio. It may be reasoned that oftentimes a video or audio message will be transcribed into text, and that Weber's (1990) definition is encompassing the media such as audio and video. Reitz

(2004) provides a much more elaborate definition of content analysis by making the procedures and tools used more explicit, “Close analysis of explicit and implicit messages of a text through classification and evaluation of key concepts, symbols, and themes to determine meaning and explain its effect on the audience”(p. 173).

This research specifically uses the quantitative method of content analysis which Holsti (1968) defines as "any technique for making inferences by systematically and objectively identifying specified characteristics of messages."(p. 608), whereas Berelson (1952) explains content analysis as "a research technique for the objective, systematic, and quantitative description of the manifest content of communication"(p. 220). Kerlinger (1986) defined content analysis as a method of studying and analyzing communication in a systematic, objective, and quantitative manner for the purpose of measuring variables. These researchers emphasize the aspects of the method as systematic and objective as their focus is quantitative content analysis, thus being more specific on how the data is to be gathered and analyzed, as opposed to the definitions given by Weber (1990), Neuendorf (2002), and Reitz (2004), which seem to focus more on identifying or inferencing meaning from text.

This research will illuminate best practices as defined by the YouTube content creating industry, or professional world of YouTube content creators, and used within educational YouTube videos, rather than originating from the world of academia. The reason for identifying best practices that have emerged within the industry is that development and changes occur at a more rapid pace than academia has the opportunity to research, document, and vet such best practices. To sum it up, the industry is more contemporary than academia, which is the result of the different roles and functions they fulfil within society.

Google's YouTube algorithmically categorizes certain videos into sections by determining the central topics in videos (YouTube [3], 2015). YouTube creates an auto-generated channel or section based on trending and popular videos. The auto-generated channel names start with a hashtag (#). This study will use the auto-generated channel #education as the source for communication with which to apply content analysis.

2.2 Content Analysis

For this study two videos per YouTube channel, which are found within the #education channel, are analyzed in order to capture a more reliable sample from the channel from which the videos are obtained. A total of 14 different YouTube Channels will be selected, bringing the total sample size to 28 videos.

The Pearson's Chi-Square will be used as a statistical hypothesis test. This test will evaluate the likelihood of differences arising by chance from sets of categorical data. Pearson's chi-squared test was devised in 1900 by Karl Pearson (1992) to evaluate the results of statistical procedures by referencing the chi-squared distribution.

The Pearson's chi-squared tests for a null hypothesis which asserts that the events observed from the sample have a frequency distribution which are within the margin of error of the hypothesized distribution.

Pearson's Chi-Square is used as a result of the small sample size of videos analyzed. The reason for the small sample size of videos is because of the coding work that has to be done. The process of coding for video content is iterative in nature as it will often be adapted, changed and added as the analysis of the video content proceeds. This has to be done in order to ensure maximum compatibility with academic standards and integrity, and in particular those of from

the art of oral communication in public context or public speaking. This results in analyzing video content being a very time consuming process,

2.3 Analysis

The initial research did not establish the value for a given variable, for example, whether a citation density of 3 per minute was considered to be high or not. The objective was to discover by observation what may have been considered to be low and high quantities of the observed variables as defined by the industry. As such it would be prejudicial to have assigned numerical values to the variables 'low and high.' Instead a value of high or low was assigned based upon the observed quantitative results of all the analyzed content.

A set of variables was nominally measured and have been identified as potentially having an impact on the the viewer's ability to take in information, the message communicated by the video, and the audience of educational YouTube content. Based on captured variable data from the educational YouTube content, the subsequent results and analyses of said results have lead to a better understanding and potential identification of best practices of one or more of the observed and measured variables. The following set of variables within educational YouTube content was measured and analyzed.

2.3.1 Video frame cuts

Audience attention span has been reduced over time as a result of the increasing use of the internet as well as mobile technology, primarily in the form of smartphones and tablets. In 2013 the average user's attention span was 8 seconds, down from 12 seconds in 2000 (Gausby, 2015). Gausby's report issued by Microsoft concludes that there is intense competition for attention, but that audiences are also becoming increasingly proficient at simultaneously

processing information from different sources. Their advice is to keep messages concise, to the point, personal, to be interactive, and use a lot of movement in the message conveyed.

A video frame cut is a type of film transition which is made in post-production and involves attaching two separate scenes or shots that are combined, albeit often a minimal change, forcing a viewer to refocus and re-engage with the video. It may be compared to the rule to do something unexpected or using humor when addressing an audience in order to keep their attention (Lamson, 2014; Toastmasters International, 2012). It will thus be useful to see to what extent cuts are used to keep the attention of the audience focused on the video content.

2.3.2 Citation density

Traditionally academia places a major emphasis on citations and references as it establishes credibility in the writer's work, as well as giving other the opportunity to verify one's sources. Another reason for academia to emphasize citations is giving credit to those who originated the ideas upon which a new idea is based (Texas A&M). Through observation it may be revealed whether the industry follows, broadly, the same line of reasoning regarding establishing credibility through a high citation density.

2.3.3 Full screen visual aids

A full screen visual aid helps the viewer focus attention on the visual aid, while the presenter or narrator might explain something within or about the visual aid. Full screen visuals aid can be still images (fixed), or animated, and can assist in illustrating complex pieces of information. By measuring the frequency of full screen visual aids per minute it is possible to measure how often the content creators wish the audience to focus on the visual aids, or believe that the audience should focus on the visual aids. Full screen visual aids used for transition

purposes are also included, and will be counted towards the total number of full screen visual aids appearing in the video.

2.3.4 Partial screen visuals aids

Besides full screen visuals, much educational YouTube content also employs the use of visuals aids on the side. This means these visual aids do not utilize the entire screen, and often appear on screen together with the presenter or host of the show. The partial screen visual aids can be stills images as well animated visual aids within the video content. The visual aids often are simplistic in nature and used as enhancers, such as showing the name of a chemical or the portrait of a historical figure that is verbally mentioned. Partial screen visual aids are measured per minute. It is possible for multiple partial screen visual aids to be on screen during the same time. It is also possible that a partial screen visual aid appears on screen while another partial screen visual aid is on screen. These should all be counted as individual partial screen visual aids.

2.3.5 Presenter & Narrator

Whether a piece of educational YouTube content is presented by means of a presenter or host, or by means of narration, will be determined per video. This determination will be made based on which of these have the estimated majority of screen time, so exact timing will not be done, as these are not useful for this research. As a researcher I have observed much YouTube content and perceived that YouTube content has a clear presenter or narrator. It is, however, hypothetically possible to have a near even split between narration and a presenter, yet it is improbable.

The interesting part of these results will, in part, be what the viewers prefer -- presenter, or narrator -- as the channels have been chosen based on popularity. This is, however, only one factor in what might make a successful educational video.

2.3.6 Ambiguity

Ambiguity within the context of this research refers to the degree of certainty that is provided within the video regarding the topic or subtopic discussed. Ambiguity is perceived a difficult term to accurately define. It is often associated with vagueness, but pertains to a degree of certainty, or uncertainty, within any given situation. Ambiguity can be described as ". . . those situations where the information available to the decision maker is insufficient to form a probabilistic view of the world" (Amarante, 2014, p.1).

The objective of measuring this variable is to determine how long content creators keep their audience in relative suspense. The degree of certainty is measured per minute. Within the timeframe of 60 seconds both certainty and uncertainty can be given by both answering a question, and raising a new question for example. The degree of certainty per minute is determined by whether either certainty or uncertainty has the most time within that minute.

2.3.7 Request for interaction

A request for interaction means to actively engage with the audience as well as to request them to directly or indirectly respond. Within the scope of this research, requests for interaction may be as simple as asking to subscribe to the channel, like a video, or comment on a video. However, they could also be more elaborate as in requesting to meet at an event, or submit photos or videos.

2.4 Channels reviewed

2.4.1 Criteria

From YouTube's Education section, a selection of YouTube Channels has been made which adhere to the criteria that are set up for this research study. The content has to be made for online video distribution (in common vernacular; 'it has to be made for YouTube'). A lecture or classroom recording does not qualify. The total length of a video has to be within the timeframe of 10 minutes. The actual video can be shorter, as sponsorship messages, and closing credits or links to other videos may be included. The following YouTube Channels have been selected based on the aforementioned set of criteria:

SciShow: https://www.youtube.com/user/scishow/featured

The Slow Mo Guys: https://www.youtube.com/user/theslowmoguys/featured

The Brainscoop: https://www.youtube.com/user/thebrainscoop/featured

Vsauce: https://www.youtube.com/user/Vsauce/featured

Mental Floss: https://www.youtube.com/user/MentalFlossVideo/featured

Film Riot: https://www.youtube.com/user/filmriot/featured

SoulPancake: https://www.youtube.com/user/soulpancake/featured

Big Think: https://www.youtube.com/user/bigthink/featured

Mark Kulek https://www.youtube.com/user/Gifukids/videos

Veritasium: https://www.youtube.com/user/1veritasium/featured

The Ukulele Teacher: https://www.youtube.com/user/TheUkuleleTeacher/featured

Khan Academy: https://www.youtube.com/user/khanacademy/featured

Numberphile: https://www.youtube.com/user/numberphile/featured

AsapSCIENCE: https://www.youtube.com/user/AsapSCIENCE/featured

2.4.2 Interrater reliability testing

The primary concern of interrater reliability testing is to test the accuracy of content analysis by the researcher. In order to confirm whether the original content analysis has passed the interrater reliability test, it has to pass a percentage agreement. There is always the possibility of chance agreement, but this is more likely with two coders, as well as with few degrees of freedom when it comes to coding categories. For example, with binary options, s the interrater has a 50% chance to "guess" the right answer. Cohen (1960) remarked on percentage agreement that "It takes relatively little in the way of sophistication to appreciate the inadequacy of this solution"(p. 38). Even though Cohen's 1960's criticism of the percentage agreement that there will always be a possible chance agreement was in the 1960's, researchers and scholars have noted that this problem still seems to persist within content analytics and interrater reliability testing (Hughes & Garrett, 1990, Kolbe & Burnett, 1991).

There are several statistics that take this chance agreement into account and try to correct for this. Hughes and Garrett (1990) reviewed and described multiple approaches to correct for this chance agreement. An often used approach is "Krippendorff's alpha" (Krippendorff, 2012). This method of interrater reliability adjusts itself for small sample sizes, seemingly making it well suited for this research, as it relies on a small sample size (n = 28). However, Krippendorff's alpha needs at least three or more interrater reliability coders. Cohen's Kappa (1960) is often used to test interrater reliability, testing whether variables measured in a study have correct representations. Cohen's Kappa is not reliant on a minimum number of interrater reliability testers, allowing for variability of research group participants. Cohen's Kappa uses at least two raters and compares data across a larger number of instances for reliability. It does have its limitations. For example questioned within the field of medical sciences whether the suggested

interpretation by Cohen is too lenient for medical tests and analyses (McHugh, 2012). However, as this research does not involve sensitive data, and results requiring narrow margins of error like in medical science, Cohen's Kappa should be sufficient to address the interrater reliability.

The formula used for Cohen's Kappa is;

$$\kappa = \frac{p_o - p_e}{1 - p_e},$$

Where:

P_o = Observed percentage of agreement,

P_e = Expected percentage of agreement.

2.4.3 Researcher Reflexivity

Researchers are humans, they naturally hold biases which are formed by their experiences throughout life, shaping their attitudes and beliefs. Despite good intentions these biases can seep into and color their research and its results. These biases can be from the fairly obvious to the subtle, and barely noticeable. Stephen Jay Gould (1996) investigates racial biases in science from the late-1700 until 1950's history in biology and evolutionary theory by pointing out that researchers held beliefs and prejudices that shaped their research. He illustrated this by looking at the research methods used and the results they produced. Stephen Jay Gould made it clear that researchers often had a racial prejudice, believing that black people were inferior and had smaller brains. The results subsequently supported their prejudice as they unconsciously steered the research in this direction.

What Stephen Jay Gould showed is that researchers throughout time have held beliefs that are reflected in their works. Even though we may have improved education on the subject matter of biases, beliefs, and attitudes, does not make us immune to them. Researchers have to

take care, re-evaluate, and reflect upon their works, their conclusions, and methods. Sometimes this re-evaluation can be done with the help of third parties, such as interrater testing.

Equally important is that others are able to investigate our results, as well as our beliefs and attitudes. This is, however, a difficult task unless the researcher is transparent about it in the research. It is thus that the researcher should disclose their beliefs and attitudes, as well as other relevant factors.

I admit to being an audio-visual learner, having discovered early in my education that I thus favor video over reading, or writing. I am an early adopter for many new technologies (Rogers, 2010), and have been for many years a frequenter of YouTube. Like most YouTube of consumers, prosumers (Toffler, 1980), and producers, I am subscribed to a multitude of YouTube channels, including some of the channels used in this research. After being a long time viewer of YouTube content, I have as of late been thinking of starting my own YouTube channel and creating videos of my own and with this going from being strictly a consumer of content to becoming a prosumer. Furthermore I tend toward a degree of technological determinism in my thought processes, and in solving problems.

2.5 Coding

2.5.1 Citations and references

Many references and citations are used within YouTube videos, some easier to distinguish than others. For this study a guideline was created to establish a comprehensive guide for understanding what is considered a reference or citation.

Direct references such as, 'according to . . .' or '[name] invented/ discovered/ created/ etc. . . .' are considered citations or references. Indirect references are more difficult to define as these are 'hidden' within the larger context of what is said. Often this piece of information is

specific to one person, location, or organization without reasonably being considered common knowledge. The date of an invention or discovery is considered knowledge being tied to the event of the discovery or invention itself. The date of an invention is thus for this coding considered a reference. Information that is not considered an indirect reference or citation are birthdays and holidays. Although a person's birthday or a holiday may not be known to everyone, it is not considered to be knowledge, in the sense that it was created. When one observes a reference or citation, it is counted as one. Citation density will be measured in citations and references per minute.

2.5.2 Video frame cuts

A video frame cut is any change within the video where two separate film fragments are directly connected, whereas originally there was another film segment in between. A video frame cut can be between two segments within the same environment, possibly even without the camera moving, or between two different locations and times. Any jump in scene, that is otherwise physically impossible is considered a video frame cut, and should be counted as such. Video frame cuts will be measured in cuts per minute.

2.5.3 Presenter and Narrator

A presenter is someone on screen conveying information or speaking to an audience. A narrator is someone speaking to an audience but not on screen while conveying information. For example, explaining or describing the actions or movements of an animal that is on screen. Speaking while showing a diagram, still image, chart or other visual aids would not be considered narration, as it shows similarities to the use of a PowerPoint slide. If a video relies

upon animation and the speaker or author is not visible, it is considered narration. Regarding the notation of how a video is represented in the data, this is as follow;

Presenter - 1

Narrator - 2

2.5.4 Full screen visual aids

Full screen visual aids are considered such when one could reasonably consider them as PowerPoint slide substitutes. This could also include a video fragment or an animation or animated GIF (file type, Graphic Interchange Format). It is not considered a full screen visual aid if the footage of the surrounding area is of where the presenter or narrator is thought to be, such as in nature. Instead, the video is considered to be narrated and full or partial screen visual aids would have to be placed on top or the narrated footage. For example, it is often thought that Sir Richard Attenborough is narrating while on location because he is also seen presenting on screen, at least for a short time. In actuality he most likely records the narration in a recording studio. His videos are considered narrated and if a visual would be placed on top of the nature footage that would be considered a visual aid, more accurately a partial screen visual aid.

2.5.5 Partial screen visual aids

Unlike full screen visual aids which cover the entire screen for the duration that they are shown to the audience, partial screen visual aids are shown on screen together with the presenter of the video. Partial screen visual aids are often on the side of the presenter, but could overlap the presenter. Partial screen visual aids could even, by means of acting on part of the presenter, suggest interaction between presenter and partial screen visual aid. For example, a partial screen visual aid could be animated and ask the presenter a question to which the presenter responds, or

a partial screen visual aid could make a statement, reaction, or answer a question the presenter asks. Text and words are also considered images.

2.5.6 Level of ambiguity

Ambiguity was a fairly difficult variable to define with a set of rules and guidelines within the context of videos as the concept of ambiguity itself is quite abstract. In the context of this research ambiguity will be measured per minute in a binary, yes or no. The important question to determine ambiguity in a video is whether the host or producer provides closure, often in the form of an answer, in a given minute regarding a statement made, a topic being explored, or a question asked. Some examples of opening ambiguity could be, 'Why is . . . like this?', 'Before feminism . . . there was another important movement', or 'Let's explore what the properties of Cyclohexanone are'. If the ambiguity is not resolved and no certainty is reached within the minute it is measured then that minute is considered uncertain in regards to ambiguity. However, if certainty is reached in a following minute then this is considered to have achieved certainty. In case multiple questions or statements are made, opening up ambiguity, but not all are answered within the timeframe, then the average is determined. If the value is between 1.0 and 1.5 then that minute is considered uncertain, between 1.51 and 2.0 is considered certain.

2.5.7 Requests for interaction

Requests for interaction are measured per minute. A request for interaction within the context of YouTube is to seek a response from the audience. The request for interaction can be passive or rhetorical, for example, by asking the audience a question such as, 'How is it going guys/girls?'. An active request for interaction could be, 'What do you think? Please leave your

comments below in the comment section', 'Please subscribe to my YouTube channel', or 'Give that like button a click'.

2.6 Conversion of content analytics to numeric values

There are three types of Aristotelian speeches, namely; Informative speeches, Persuasive speeches, and ceremonial speeches. The latter is often referred to as entertaining speeches. Within this research, these speech types are used to describe the videos reviewed. The speech types will be converted to a nominal system;

Informative - 1

Persuasive - 2

Entertaining - 3

The level of ambiguity, represented by two variables, certainty and uncertainty, will be numbered nominally;

Uncertainty - 1

Certainty - 2

Requests for interaction is represented by a binary choice of 'yes', and 'no', nominally labelled;

No - 1

Yes - 2

2.7 Definitions

A channel; the homepage for a Google account on YouTube where a user can upload video content to the user account (Karch). The owner or owners can be reasonably considered the author or authors of said channel.

Author, or content creator; a person, a group of people, or even a production company or organization that creates content for online video distribution. An author or content creator may be referred to by their Channel name if this can reasonably be considered their alias too, or if primarily known through their channel name.

Educational video content; online video content with the main intent of transferring knowledge or information. Within the scope of this project only content categorized by YouTube within the education section is considered educational. This does, however, not mean there is no other educational content on YouTube, but merely not identified as such by YouTube.

3.0

Analysis

3.1 Descriptive Statistics

Within this research variables were measured on a per minute basis, which lowered the accuracy of results, as some variables are more sensitive to time than others. The following variables are considered metadata variables of videos, as these do not describe any attributes of content within videos; The length of time of the video, subscribers to the channel to which the video belongs, total video views of a channel, views of the videos reviewed, likes of the video, and dislikes of the video. The other variables that were measured are considered content variables. Content variables are; video frame cuts per minute, citation density per minute, full screen visual aids, partial screen visual aids, type of speech, presentation style, and requests for interaction. The data analyzed resulted in the following descriptive statistics,

Descriptive Statistics					
		Time in Minutes and Seconds	Subscribers	Total Channel Views	Views on Reviewed Videos
Total	N	28	28	28	28
	Mean	0:05:05	2,287,206.57	250,764,124.93	838,418.79
	Median	0:04:54	1,429,823.00	149,606,018.50	120,358.50
	Range	0:05:25	8,891,543.00	815,573,213.00	4,615,246.00
	Std. Deviation	0:01:28	2,353,101.938	242,271,846.059	1,431,091.306

Descriptive Statistics				
		Likes on Reviewed Videos	Dislikes on Reviewed Videos	Speech Purpose
Total	N	28	28	28
	Mean	18,304.71	500.68	
	Median	2,815.00	122.50	
	Range	104,695	4,572	
	Std. Deviation	30,349.898	938.939	

Descriptive Statistics					
		Presenter, or narrator	Cuts per Minute	Citation Density per Minute	Full screen visual aids
Total	N	28	28	28	28
	Mean		6.8772	2.1273	2.5288
	Median		6.8750	2.0375	2.3095
	Range		21.75	6.80	9.38

	Std. Deviation		4.53895	1.67940	2.14092

Descriptive Statistics					
		Partial screen visual aids	Visuals are Animated or Static	Level of Certainty	Is the host/ video requesting interaction with the viewer
Total	N	28	28	28	28
	Mean	1.9854	1.3013		1.25
	Median	.5476	1.0000		1.00
	Range	12.25	1.33		1
	Std. Deviation	3.52702	.41101	.3951	.441

Table 1 - Descriptive statistics

The mean and median for the duration of videos is observed close to five minutes with a range of 5:25 varying from 2:45 - 8:10. Despite the small sample size of the duration of videos, these appear to show an even distribution.

From the 14 reviewed channels, four channels had less than one million subscribers, while three channels had between one and two million subscribers. Two channels had between two and three million subscribers, one channel had between four and five million as well as one channel having between five and six million subscribers. The last channel has a subscriber count over eight million. The difference in subscriber count relates strongly to other metadata variables such as views, likes, and dislikes, showing that with an increased subscriber count comes a linearly increased count of views, likes, and dislikes.

Analyzing the descriptive data, a trend emerged showing an increased number of video frame cuts at the beginning (minute 0-1) in 18 out of 28 videos based on the mean of video cuts of each individual video. The ten videos that did not show an increased rate of video frame cuts in the first minute, two videos showed no video frame cuts at all. In case of YouTube content, content creators often add some promotions to their content, referring to other videos they made,

and sometimes to other channels they maintain. This self-promotion usually appears in the form of a fixed screen with few or no video frame cuts, and thus decreases the number of video frame cuts observed in the last minute of the video. Another component that influences the number of video frame cuts within the last minute is the accurate time of the video. The data suggests that the number of video frame cuts towards the end of videos increases in 13 of the 28 videos.

The majority (16) of videos did show entertaining elements such as jokes, cartoon elements, humor, or word-plays. Seven videos did not appear to use any elements of entertainment, and five videos predominantly showed signs of persuasion. All videos included informative content, but differed in speech type. The data showed that of 28 videos, 23 used a presenter for delivery type, the remaining five were delivered via narration. The narrated videos were all presented by men. From the videos with presenters 19 were performed by men, whereas four were presented by women.

3.2 Pearson's Chi-Square Statistics

All the variables were cross-referenced against each other utilizing the IBM's SPSS (v20) CrossTabs analysis tool, and choosing Chi-Square. This means that Chi-Square was used on 'time x subscribers', 'time x channel views', etc., continued with 'subscribers x channel views', etc. Whenever a sample size between two categorical values with expected cell sizes of 5 or less was analyzed, SPSS (v20) defaulted to using Fischer's Exact statistical calculation in favor of the Chi Square Test. Fischer's Exact Test produces an exact P-value.

A result, be it a Fischer's Exact Test or a Pearson's Chi-square Test of Independence, was considered significant when a result value of .05 or less was observed. This means that an observed value had to be between .00 and .05. However, as the data analyzed needed to be nominalized for the Chi square test or Fischer's exact test in case of small values sizes, the

results are less exact than when a numerical test was used without nominalized data. For this exploratory study it was, however, more relevant to obtain indications of relevance rather than maximum accuracy of significance.

Strong correlations with a high degree of significance were observed between metadata variables of videos except for the duration of the videos. No significant correlations were observed between duration of videos and other metadata variables. The range of high significance between correlations with Fischer's Exact two-sided test between metadata variables, excluding duration of videos is; .000 - .007.

Strong correlations with a high degree of significance were found between the following variables;

Fisher's Exact Test:	Exact Significance (2-sided)
Time and Dislikes	.054
Presentation type and Video frame cuts	.044
Video frame cuts and Partial screen visual aids	.021

Table 3 - Strong correlations with high degree of significance

	A symp. Significance (2-Sided)
Video views and Speech Type	.049 (Pearson's Chi Square) .039 (Likelihood ratio)
Likes and Speech Type	.049 (Pearson's Chi Square) .039 (Likelihood ratio)
Dislikes and Speech Type	.007 (Pearson's Chi Square) .002 (Likelihood ratio)
(almost significant) Speech Type and Citation density	.069 (Pearson's Chi Square) .062 (Likelihood ratio)

Table 4 - Speech type

There seems to be a reasonable correlation between the duration of a video and the number of dislikes it receives. This correlation appears to be inverse, thus as the duration of a video increases the number of dislikes decreases. As seen in table 4, this correlation is not clearly

significant, and thus it should be seen as suggestive, or perhaps indicative, of what one might observe with a larger sample size.

It appears that there is a correlation between video frame cuts and presentation type. The correlation shows that videos with a presenter have more video frame cuts per minute on average than video that are narrated. A strong correlation between video frame cuts and the number of partial screen visual aids seems to be present.

Speech type appears to shows the highest number of significant and near-significant findings. Observations of data show that Speech type has a strong correlation with likes and dislikes, as well as citation density. There appears to be no favoring of a particular speech type compared to another speech type correlated to likes and dislikes. Likewise there does not appear to be a direct pattern between speech type and citation density. The correlations might have more to do with the particular content a channel creates and publishes, as opposed to a particular speech type favoring citation density.

3.3 Observations of data without prior tentative hypothesis

The data shows that 19 videos hold a preference for full screen visual aids compared to partial screen visual aids used in conjunction with the presenter on screen. None of the videos containing a higher rate of full screen visuals show a mean more than ten. Whereas three out of seven videos preferred partial screen visuals which show a mean more than ten. Out of the 28 reviewed videos, two had equal amounts of full screen visual aids and partial screen visual aids, thus not showing preference. The two videos that showed an equal amount of full screen visual aids and partial screen visual aids, had low median values (0.2 - 0.4), and were from two different channels. These videos had significantly less views than the other reviewed videos from the same channels, as can be seen in the following table;

Channel #	Number of video views	Median of Full screen visual aids	Median of full screen visual aids
1	2,629,952	0.4	0.4
1	4,617,648	0.75	1
2	109,719	0	0.67
2	27,334	0.2	0.2

Table 2 - Visual aid equality

The aforementioned channels were not the only that displayed significant differences in number of views. Other channels showed significant differences between views, however, these displayed no noticeable patterns in the relationships between full screen visual aids and partial screen visual aids.

4.0

Conclusion

4.1 Conclusions

No strong correlation between cuts and subscriber count, video views, likes, or dislikes, ambiguity, or requests for interaction was found in the analyzed data. In effect there were, sans two, no variables that showed a strong correlation with high significance in this exploratory study. This, however, might be in itself indicate significance. It could be hypothesized that the audience of educational YouTube content has a degree of tolerance for various combinations and degrees of variability of best practices, preventing this research from uncovering correlations using the Chi-Square test. These degrees of tolerance for combinations and variations of variables could be akin to Burke's Pentad or dramatism for public speaking (Burke, 1969). Despite the different approach this conclusion would be in line with the conclusion ten Hove and van der Meij came to after reviewing the most popular instructional videos; that users seem to appreciate a wide variety of physical characteristics in their videos (2015). The low significance of variable correlations was not entirely expected despite that the audience could well have a tolerance for a mixture of variables. A pentadic analysis approach might suggest that there are different patterns in how video characteristics combine even as the descriptive statistics reveal only the range of variation.

Based on the small sample size the range, mean and median of the video length seems evenly distributed, which is interesting, but perhaps not significant. It might, however, be worth investigating in future research whether there is a more ideal range of timing for videos. This could be achieved by sampling the most popular videos and investigating their time properties such as mean, median, and range. From the analyzed data of educational YouTube content

reviewed, there appears to be a pattern within the cutscenes of videos. The number of video frame cuts are generally higher at the beginning and the end of videos. This could possibly indicate that the videos reviewed might follow a similar pattern that is found in public speaking outlines, where in general the beginning and end consist of more and smaller components. There are two videos that showed zero video frame cuts as these were narrated and showed a continuous screen, and it may be argued that these could be removed from the equation. Nevertheless, the observation of video frame cuts at the beginning and end of videos does not show overwhelming evidence, thus it could be wishful thinking or merely a suggestion.

Observing the descriptive data of video frame cuts there appears to be evidence to support that not only the first minute of videos has more than the average video frame cuts but the second minute as well. 13 out of 28 videos have equal or more video frame cuts in the second minute. Although not conclusive, it may suggest that at least a part of the videos on YouTube is increasing the length of their introductory segment. This would indicate that these YouTube videos are assigning more time to their introduction than the 15% that public speeches traditionally assigned within the timeframe. Perhaps the instructional course of public speaking could after careful review of an increased sample size conclude to become more flexible in the rigidity of allotted time for introductions and instead allow a spectrum between 15% and 25% of a speech to be designated to introductions. Within this sample size there is no evidence to suggest that the minute before an increased video frame cut minute at the end of a video exhibit increased video frame cuts as well. This might suggest that YouTube videos have less focus on a traditional conclusion as seen in public oratory speeches, and instead use the body of a video to directly make conclusions. Furthermore, the results of this research regarding video cut frames might be different had they been measured per second rather than per minute. This would be an

important consideration for future studies. It would, however, be interesting to further investigate this hypothesis of whether the number of video frame cuts are more in the first and last minute than in the other minutes of a video. Furthermore, the high count of video frame cuts could also be done on purpose in order to retain the audience's attention. This may seem counter-intuitive as the rapid pace of video frame cuts might be perceived as distracting, yet it might only be distracting within the video, but still keep the audience more focused on it, and minimize distraction from their surroundings. According to Willingham "Change grabs attention . . . change topics, . . . or in some other way show that you are shifting gears, virtually every student's attention will come back to you, and you will have a new chance to engage them" (2009, p. 17).

The prevalence of entertainment within the videos and popularity of these videos suggests that this is important to audiences. In relationship to classroom teaching this may suggest that students could respond positively to more use of entertainment within the classroom environment. The suggestion could, however, also be made that there is an opportunity for the teachings of oral communication in the public context (public speaking) to educate students on ceremonial or entertaining speeches. From the 23 videos with a presenter, 19 (82.6%) videos were performed by men and four (17.4%) by women. This shows a reasonable consistency with Kim's findings of the differences between men (65 - 80.25%) and women (16 - 19.75) in publishing videos on YouTube (2009).

The not quite significant inverse correlation between speech type and dislikes could be explained as follows; users are more likely to try short videos, as more users might not like a particular short video. Users who watch a longer video are making a commitment to watch the video, and are more likely to not dislike a video as they have invested more of their time and with this convince oneself that it is a good video.

The fairly high number, comparatively to all other variables, of strong and near-strong correlations of significance involving variable speech type suggests that this may well be an important or influential factor for YouTube users to watch a video, and to like or dislike it. The least expected near-significant correlation was between speech type and citation density. The correlation trends towards informative videos having a higher citation density than videos utilizing entertaining elements.

The correlation between video frame cuts and partial screen visual aids is not entirely clear, as the use of a partial screen visual aids does not need a video frame cut. It might, however, be that both the number of video frame cuts and the use of partial screen visual aids are indicative of a particular style of video. This may be a combination of variables that people have a tolerance for.

4.2 Discussion & Limitations

Given the rapid pace of change, there are many open and unexplored questions that could be asked regarding YouTube. In order to keep this exploratory research focused and within a scope of what was reasonably achievable within the timeframe, many interesting aspects to study were omitted. This type of study is more time consuming than I thought. Initially I believed it was entirely my doing, and to a degree this is probably true. However, I discovered that ten Hove and van der Meij state that when they started their research, YouTube had changed its five-star rating system to likes and dislikes (YouTube, 2010). YouTube made this change in January of 2010. From this I conclude that I probably could have done a lot more work if I had made up my mind earlier in my graduate degree program. If I had known about the research of ten Hove and van der Meij it would most definitely have affected this research in a more pronounced way as I would have looked to it for guidance on this particular topic.

There are many aspects of engagement and possible best practices this study did not cover, such as; the mood or tone setting of the video, the host's emotional expression level, positive and negative valence of words within the video, or word count per minute. This study focused mostly on relatively easily quantifiable aspects of videos to create a foundation for potential future studies.

Another, self-imposed, limiting factor was that I opted to review videos labelled by YouTube under the #Education channel. This was purposefully done in order to limit potential arguments about what might qualify as educational. Ten Hove and van der Meij defined videos by their instructional type, a definition perhaps easier to operationalize (2015).

I considered analyzing the comment sections of reviewed videos for positive and negative valence. The decision was made not to include positive and negative valence of videos. Some video have requests for interaction. Responses to requests for interaction, however, do not necessarily require positive or negative valence, and in some cases the request for interaction is meant in a passive way, thus the video is not actually seeking responses but perhaps more a thought process. Furthermore, counting positive and negative valence of all comments presents the problem that not all valence is directed at the video and sometimes, in fact, is not related to it at all, instead the users have created separate interactions. It would thus be very hard to establish data of any meaningfulness.

The next step I might investigate in a future research project will be the influence of speech type on the likeability and viewership of videos. The sample was too small and skewed to give insight in the current project, but the value of Pearson's Chi Square result suggests that there could be an interesting interaction effect that might guide both YouTube practices and perhaps the teaching of public speaking.

5.0

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IDENTIFYING INDUSTRY DEFINED BEST PRACTICES WITHIN EDUCATIONAL YOUTUBE CONTENT, AN EXPLORATORY STUDY

By

Martin van der Kroon

RECOMMENDED:

DocuSigned by:
Brian Jarrett
100CD8E861B4405...

Brian N. Jarrett, Ph.D.

Karen Taylor

Karen M. Taylor, Ph.D.

Advisory Committee Chair

DocuSigned by:
Peter DeCaro
4AD42194F9F54AD...

Peter A. DeCaro, Ph.D.

Chair, Department of Communications

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Martin van der Kroon

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Content Index

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1.0

Review of Literature

1.1 Statement of the Problem and Goals of the Research

Academia has been a cornerstone of western civilization, harboring and safekeeping invaluable amounts of knowledge and educating generation after generation of the populous. The importance of academia in society becomes clear when we realize how much emphasis is placed on education when it comes to job, income opportunities, and social status. According to a 2012 report from the U.S. Department of Education between 2002 and 2012 the enrollment in degree-granting institutions rose 4% to 20.6 million students, while at the same time the total population increased by 10% from 287.63 million (U.S. Census Bureau, 2004) to 314.11 million in 2012. This shows that population growth far outgrew the number of students enrolled.

For hundreds of years academia has had time to mature, and establish methods of operations. This is, however, also the downside as it functions similar to many matured corporations, where policies, protocols, and control procedures are implemented to safeguard a corporation's continued existence in favor of versatility and adaptability. For a long time this didn't seem much of a problem, or perhaps was not even noticed too much as most of the world did not move at such a fast pace either. This has drastically changed in the last decade.

According to Kellner & Kim ". . . the Internet provides individuals today with a whole new pedagogical setting: decentralized and interactive communication, a participatory model of pedagogy, and an expanded flow of information, thus comprising a new field for the conjuncture of education and democracy" (2010, p. 15). The availability of and access to a relatively affordable internet, combined with visionaries and companies creating products and services on and for the internet, has tremendously increased dissemination of information. This has helped

individuals and companies alike research faster, whether it is helping a teenager in researching an essay, or a startup company with their "revolutionary" idea. Google, for example, publishes research papers done in the company. John Giannandrea, Google Vice President of engineering overseeing research and machine intelligence says, "I think the cycle time between a paper being published and something being in a product is probably shorter now than it historically has been" (Simonite, 2015). Not only has it become easier to share information, it has also become much easier to use and process information. Whereas the completion of the first sequencing of the human genome took two competing teams of researchers almost 13 years (Liou, 2010; NIH, 2010), today online services (cloud services) such as Google Genomics (2015) can now process hundreds of human genomes in minutes. These services are now available to everyone having access to internet.

The rise of social media such as Facebook, Twitter, and YouTube a.o., are giving people more options to interact, to share knowledge and information faster and over greater distances. Pietrobruno (2013) illustrates the importance of YouTube for archiving the intangible. UNESCO has made efforts to archive the immaterial cultural heritage of the world such as dance, rituals, oral languages, festivals, ceremonies, and embodied knowledge. Since there is such a vast body of intangible cultural heritage, UNESCO realized the value of user generated content, and started collaborating with YouTube to find and index instances of intangible cultural heritage recorded and uploaded by YouTube users. An illustration that shows the reality of how fast information can be disseminated across the world via use of social media is that of the professional news and journalism business using Twitter, who publish the latest breaking news on Twitter first before any other news outlet (MacMillan, 2013). The interactions on social media, giving the possibility for people to connect across the world, has also changed, and this has helped shape individuals

and cultures. According to Bouvier ". . . these new forms of communication are fused into wider patterns of changing cultural values about forms of social structure, knowledge itself and the kinds of issues that tend to form our individually civic spheres" (Bouvier, 2015, p. 149). The increased speed of information dissemination, communication, and interactions also influences our expectations as we come to expect instant gratification, becoming perpetually impatient (Muther, 2013).

The industry is outpacing academia in advancement by forfeiting much research in favor of practical testing. Adami did novel research on the topic of (then) recently released feature, video responses on YouTube (2009); less than four years later this feature was retired (YouTube Team, 2013). New features are quickly adopted and deployed by early adopters in the Information Communication Technology sector (ICT), and can just as quickly be retired, discarded, updated or replaced (Rogers, 2010). A clear example of replacing or updating a feature is what happened with the automatically generated YouTube #Education channel while this research was well underway. YouTube changed the #Education channel from #Education to 'Science & Education' and with this also retired the # (hashtag) previously used to denote auto-generated YouTube channels (YouTube [1], 2015). Testing is often done via trial and error approaches, using a democracy where users or consumers decide what works. For example, this can be seen on YouTube where people with seemingly little to no formal knowledge regarding the media industry or expertise such as public speaking became famous by communicating messages in a way viewers appreciated. Among the more well-known origin stories of a famous YouTuber is that of makeup tutorial creator Michelle Phan (Faw, 2014), who was a waitress when she started her YouTube channel 6 years ago, and now has a personal worth of 84 million dollars, her own makeup line, as well as having built a $500 million company (Robehmed,

2015). Another example is that of Ray William Johnson, who began his YouTube comedy channel '=3' (pronounced 'equals three') in his college dorm, and now produces multiple YouTube shows and movies, attributing his success to "consistency, being loyal to your audience and giving them what they want . . . really feeling out their needs . . . so they enjoy watching the most" (Cosme, 2011).

Every industry has its success stories, and there are many YouTubers who will never see fame even remotely like makeup guru Michelle Phan or comedian Ray William Johnson. However, the industry of online video content creation, whether speaking about hobbyists, professionals, or simply family and friend videos, is nevertheless sizable. YouTube alone has more than 1 billion users, some of these people are 'prosumers' (Toffler, 1980), consuming as well as producing video content for YouTube (Berrocal, Campos-Dominguez, & Redondo, 2014). Berrocal et. al. conclude, however, that people consume much more video content then they produce (2014). Similarities can be observed between YouTube and Wikipedia regarding consumption and production of content (Wikipedia, 2015). YouTube has a reported value of $70 billion dollars (Hamedy, 2015), localized in 75 countries and translated into 61 languages with half of its users viewing on mobile devices, and more than 300 hours of video uploaded every minute (YouTube [2], 2015). Despite YouTube being the largest host of online video content, there are other similar services such as Vimeo, Yahoo Screen, and Vessel, among many others. These hosts of online video content enable people to express and exchange their ideas openly, within the confines of the service policy, and come to a consensus in the public sphere, in which there is limited interference to express ideas (Habermas, 1991).

Michelle Phan creates makeup tutorials and Ray William Johnson is in comedic entertainment, but there are also quite a few content creators who focus on educational content.

Some of these educational content creators have massive audiences (subscribers) reaching millions of viewers. Some of this educational content is specific to one field of science or art, but many seem to alternate between and bridge multiple disciplines.

Many successful videos include educational content; the latter of particular interest to me as a teacher and technophile, but there is little academic knowledge on how to make such successful videos. It is here that I believe academia can learn from struggles and trial and errors of the community of online video content creators. As a researcher I am interested in improving my understanding as to what the best practices that content creators of educational content use in their video content. Do the norms used in online video content align with or differ from those used in public speaking? Is the compartmentalization that is present in academia between branches of science and the arts also as strongly present in the works of online video content creations? I do not seem to be alone in raising these types of questions regarding online educational or instructional video content. It seems timely, perhaps a zeitgeist of sorts, that two researchers (ten Hove, 2015) from the University of Twente published their paper earlier this year asking a very similar question to my own; 'What Characterizes YouTube's More Popular Instructional Videos?' It is, however, not the only study that explores the options and opportunities to utilize YouTube for educational purposes, or relate it to academia. Bouvier (2015) essentially argues for that which is a limiting factor in this research, namely that academia is only beginning to turn its attention to social media as a whole, including YouTube. Molyneaux & O'Donnell state that, "User-generated video on YouTube is just beginning to be examined by scholars" (2008, p. 3). This is unfortunate because "as a communicative medium, YT (YouTube) is a potential exemplar of the Deweyan pedagogy of learning as communication" (Kellner & Kim, 2010, p. 27).

The goal of this project is to analyze educational YouTube content and identify those elements that help convey information effectively; in essence to try to uncover best practices as found and defined by the YouTube content creation industry (from here on referred to as industry). This can range from time, to requests for interaction, the use of visuals or video aids within the video, as well as how often video frame cuts where two separate video frames are connected to create a transition are used.

Educational YouTube content is deliberately created to transfer knowledge from a host to an audience, the viewer of the video. In this regard is has a clear overlap with public speaking, which is, the art of orally performing a presentation or speech in a live setting from one person to an audience with the intent of informing, persuading, or entertaining. Even though the host is not speaking directly to the audience, but instead via video, there still needs to be a clear understanding of how to connect with the audience through the message.

1.2 Review of the Literature

1.2.1 History, revolutions, and wishful thinking

The way people are educated has remained the same for a long time. Students are situated in a classroom or lecture hall, and a teacher, lecturer, or professor disseminates information to the students. That one person conveys information to many is the current economic model for most publicly available types of education. Similarly much of mass media communication theory is based on assumptions of a one-way flow of information, as seen in the early propaganda-based models proposed by Herman & Chomsky (2010). Criticism of this model, for both communication generally (Peters, 2012) and pedagogic communication specifically, that it maintains hierarchical power differentials and promotes rigid conformity (Freire, 2000). Seen from the mathematical theory of communication by Shannon & Weaver (2015), the expert is

considered the sender of the message, sending this towards the students, who are the receivers of the message. The message, we assume, will be some form of knowledge that is conveyed. A classroom setting of sorts assists in minimizing impediments such as: 'noise', surrounding sounds, visuals, and interactions with those not directly involved in the communication process between sender and receiver.

Another perspective to view this from is economics (Robst, 2001). To have a classroom filled with students and one teacher is cost effective. This as opposed to a teacher for each student which is more costly per individual taught. Even though this could make education fairly affordable, some people have seemingly envisioned more cost-efficient methods with a wider reach that go beyond that of the classroom. French artist Villemard created a set of images in 1910 of what he envisioned the world would look like in the year 2000. One of the depictions shows how students are fed knowledge via ground up books which are delivered directly into the brain (Villemard, 1910). Thomas Edison stated in 1922, "I believe the motion picture is destined to revolutionize our educational system and that in a few years it will supplant largely, if not entirely, the use of textbooks" (Monke, 2004). The same predictions were made about different technologies, such as radio, and television, yet most education is confined to schooling and occurs as part of job training or transferring knowledge within established value systems (Kellner & Kim, 2010) and still occurs in a classroom setting with students and a teacher. One aspect these visionaries did seem to agree upon, that self-actualization as the goal of educational cannot be contained within a classroom (Rousseau, 1979; Dewey, 1916).

The focus has primarily been on cost-effectiveness and reach, or accessibility. If education were merely about transferring information, then reach and accessibility would be the most pressing issues. The problem with proposed revolutionary methods of education such as

radio transmission or television broadcasts has been the lack of student engagement, which is inherently a result of the one-way flow of information. According to Bomia et al. student engagement is a "student's willingness, need, desire and compulsion to participate in, and be successful in, the learning process promoting higher level thinking for enduring understanding" (Bomia, Beluzo, Demeester, Elander, Johnson, & Sheldon, 1997, p.3). Although using technology exclusively for education has so far not provided much success. This does not mean technology cannot facilitate or contribute to student engagement. Research shows that technology can enhance learning outcomes and student engagement via active learning, which is associated with improved academic performance (Hake, 1998; Knight & Wood, 2005; Freeman, et al., 2007; Chaplin, 2009). The increased engagement creates more positive attitudes regarding education and knowledge acquisition (Moravec, Williams, Aguilar-Roca & O'Dowd, 2009).

1.2.2 The Use and Importance of the Internet

As of 2014, 87% of U.S. adults state that they use the internet (Fox & Rainie, 2014). The National Center for Education Statistics (NCES) (U.S. Department of Education, 2010) reported that in 2009, 94% of teachers used the internet in some capacity for instructional purposes or classroom preparation. According to Child Trends Data Bank (2013), 58% of children ranging between 3 and 17 years old use the internet on a daily basis, an increase from 11% in 1997. The Pew Research Center researched teenagers between the ages of 13 and 17, and concluded that a full 92% percent of teenagers go online daily, with 24% of them online almost constantly, while 56% go online multiple times a day (Lenhart, 2015). Something teachers may not be aware of is that those children who are constantly online, and even those multiple times a day, are likely to go online the moment they are outside of the classroom, perhaps even when visiting the sanitary facilities. Although most of the time spent online by teenagers is dedicated to social media, it

shows what an integral part the internet is becoming in the lives of children, teenagers, and our future adults.

The need to have internet access to effectively study is becoming widely accepted as a necessity within academia and high school (Chen, 2014). This ranges from research for essays and papers, to speeches and presentations. It is evident that the technological advancements that mankind is making, especially with the internet, have given rise to more options and opportunities to share information, as well as to educate. From technologies such as radio, television, and VHS, to the use of email, social media, and MOOCs (Massive Open Online Course) such as Coursera and MIT Opencourseware, we can observe how much the landscape of education is diversifying when it comes to the medium of instruction delivery used. For a time the use of high bandwidth methods, such as video, were limited due to slow internet speeds. This is, however, decreasing as an issue, at least in the western world. Another important factor for the widespread availability of video is the cheap, or free, editing software, as well as relatively high quality and low cost video equipment. To exemplify the decreased cost and increased quality of video equipment, it may be observed that in 2000 a 3.34 Megapixel Canon G1 camera cost $800, in 2010 one could buy a Canon Powershot A480 camera with 10 megapixels, and overall higher specifications for $110, or a High Definition recording camera for $800 (Herman, 2010). Most smartphones now come equipped with cameras that easily produce a higher detail image with more megapixels than the earlier mentioned Canon G1 or Canon Powershot A480 (Martin, 2015). Furthermore there are a multitude of video sharing sites such as YouTube, Vimeo, Vessel, etc. which make it easy for content creators to edit and upload their videos. This can be seen in the statistics of YouTube usage, where in 2012, 72 hours of video content was uploaded per minute (Kosner, 2012). In 2013 it was more than 100 hours of video content per

minute (Russell, 2013), and in 2015 it is more than 300 hours of video per minute (YouTube [1], 2015). Among these many hours are not only cat videos and the next viral video, but also educational content. As the barriers to access information lowers, so do the barriers between fields of research, and inversely, the sharing of knowledge seems to increase within academia as interdisciplinaries become more popular.

1.2.3 Interdisciplinarity

Interdisciplinary studies are gaining popularity and have spawned their own field of research, namely, the study of Interdisciplinarity. Interdisciplinarity focuses on researching techniques to effectively and cohesively integrate multiple, often particular parts of, different fields of study and research. According to Newell (2001) "interdisciplinary study draws insights from relevant disciplines and integrates those insights into a more comprehensive understanding."

Something that is changing within education is the compartmentalization of various fields of study and research. Perhaps more accurately, the metaphorical walls between fields of study and research are starting to disappear as academia is becoming more aware that different fields of study and research are inextricably intertwined with each other. Klein (1990) concludes that, "Very often disciplinary interactions are also the inevitable result of the broadening of disciplines, . . . from a monistic to a pluralistic perspective" (p.46). The necessity of interdisciplinarity arises as systems become more complex, consisting of multiple, often non-hierarchical, systems being non-linearly connected, and at times having incompatible subsystems (Newell 2001, Klein & Newell 1996).

Educational content creators, some who may do this as a hobby or out of passion for their speciality or expertise, now create content specifically for online video sharing sites such as

YouTube. Classroom recordings can be uploaded, but are not specifically created with online video sharing in mind since the primary focus is on the classroom. As this educational content is not bound or confined to the structure and taxonomies of educational institutions, they often incorporate knowledge from various fields, encouraging an interdisciplinary approach. While interdisciplinarity is valuable as it reaches academic content, it becomes complicated as it reaches video content. The interdisciplinarity of educational content online makes it harder, perhaps impractical, to categorize the educational content into one familiar category. Therefore categories such as mathematics, physics, biology, or psychology become irrelevant.

Newell et al. (1996) state that the reason for change into a more interdisciplinary approach is knowledge itself. The disciplinary boundaries are blurring and the cross-fertilization and the borrowing of methods and concepts is becoming more commonplace, creating knowledge that is heterogenous, complex, and hybrid in nature (Easton and Schelling, 1991; Gibbons, Limoges, Nowotny, Schwartzman, Scott, & Trow, 1994). The internet is probably also the most well-known example of a complex system, consisting of heterogeneous and hybridized knowledge and information (Park & Willinger, 2005). The rise of the internet has given people the ability to make sharing information easier and faster across distances, to form collaborations within and across disciplines. Even though the sharing of information by means of technology has become easier, this does not mean that communication has become easier. It might well be argued that communication has become more complicated as new modes of communication require new rules of engagement and interaction between people in order to understand one another correctly. Perhaps the clearest illustration of such is the 'text message.' The text message has increased our ability to share information, yet many miscommunications arise as a result of

misinterpretations of intent. These miscommunications via newer forms of media can even damage relationships (Gunther, 2011).

1.2.4 Engagement and Stimuli

Many changes in methods and styles of education have been created and proposed, some significantly altering the way the goal and function of education is perceived. Prior to the 1970's students who dropped out of college were seen as weak of character, or showed lack of perseverance, or not intelligent enough to obtain a college degree. Research primarily performed in the 1970's and 1980's by Alexander Astin, Ernest Pascarella, and Patrick Terenzini, showcased the importance of student involvement to the learning outcomes of students and student retention (Astin, 1975, 1984; Endo & Harpel, 1982; Pascarella, 1980; Pascarella & Chapman, 1983; Pascarella & Terenzini, 1980; Terenzini, Lorang, & Pascarella, 1981). Much research has been done on the effects of student engagement and the correlation with the success of students in learning (Astin, 1984; Berger and Milem, 1999; Kuh, Cruce, Shoup, Kinzie, & Gonyea, 2008). Muller (2012) states that just merely explaining something concisely to students is not always effective. He says that students who have to engage more actively to process the information presented actually have a better learning outcome.

Dwyer Jr. (1968) concluded that students who received oral instruction with visual aids accompanying the oral instructions scored higher on a test given after the instruction with visual aids versus students who only received oral instruction. Public speaking classes for decades since that time have incorporated this finding by requiring one or more speech to be accompanied by visual aids. He does, however, note that different types of visual aids can have varying results, for example black and white images, color images, detailed versus abstract images.

Many studies have concluded that the recall of information can be greatly improved by using visual aids. Verdi, Johnson, Stock, Kulhavy, and Whitman-Ahern (1997) concluded that students who are shown visual aids with the accompanying text recalled more information than those students who were given only the text. Schacter (2008) notes that visual aids are concrete objects which are easier to remember (illustrations, icons, logos, etc.) compared to a text which is more abstract and thus harder to process.

Information density is another process that can be relatively hard to process for the brain (Russell, 1984). Not only can information be difficult to remember, it can also be misremembered. With information density often comes higher citation density, as one will attribute the source of the information to the author. The attribution can be as simple as "Einstein helped invent the atomic bomb," although ideally it would include a date, and perhaps a place or for whom.

1.2.5 Best Practices

Best practices in YouTube videos often come to be after experimentation. A content creator might try something new, and depending on viewer feedback, continue to use it. Not only do content creators experiment with new ways of delivering a message or content, but they also copy from one another. An example of this on YouTube is the 'jump-cut,' a cut within the video where the camera is kept stationary and fixed on the same location, but the host changes position, creating a jump of where the host is located on screen. Among the first to popularize this way of recording content was Ray William Johnson with his '=3' show. Other shows began to utilize this method too, such as PBS Idea Channel, which stated that it has been inspired, in part, by the '=3' show despite producing entirely different content (PBS Idea Channel, 2012).

1.2.6 Contemporary Research

More contemporary research regarding YouTube was disclosed. This research, however, was found after my research was well underway. As such, the research could no longer be incorporated into my own. Nevertheless, it is important to highlight this contemporary research.

The research from ten Hove and van der Meij briefly mentioned previously has very similar research goals to this research (2015). The researchers investigate the characteristics that attribute to the success of an instructional video. They reviewed 250 videos for declarative knowledge development, and from this selected a sample of 75 videos based on popularity type and type of declarative knowledge. Their conclusion is that more popular instructional videos differ from less popular instructional videos in characteristics. Ten Hove and van der Meij observe that popular videos are different in the following ways, having higher resolution uploaded videos, more frequent static visual aids, a more frequent combination of static and animated visual aids, more short on-screen texts, more available subtitles, more frequent background music, less background noise, and a faster speaking rate.

1.3 Tentative hypotheses

This research is of an exploratory nature, utilizing the professional world rather than academia as a starting point. It is thus not clear what results might be uncovered in this research, and as such there is no strictly defined research question. Instead, a set of hypotheses of outcomes that might be observed are presented. The list of hypotheses is as follows;

The first and last minute of videos have more cuts than the main body of the video, showing a parallel to the ways in which speeches have introductions and conclusions.

A majority of videos will contain entertaining elements, showing that the use of humor within education may transfer to educational YouTube content.

There is a correlation between duration of a video and the number of likes and dislikes. Shorter videos will receive more likes and less dislikes as people will appreciate conciseness and brevity of videos.

A correlation could exist between presentation type and video frame cuts, where the video frame cuts are higher in videos using a presenter as opposed to a narrator because more video takes will be recorded for a scene, whereas with narrator only audio frame cuts have to be made which is not accounted for within this video.

Speech type is proportionally correlated to likes, and dislikes showing that viewers give preference to ceremonial (entertaining) speech type videos.

2.0

Research Methodology

The purpose of this study was to understand what educational content creators do within their videos that may be described as 'best practices.' In order to achieve this I engaged in quantitative content analysis, utilizing a codebook on the videos reviewed. The gathered data was analysed using Pearson's chi-square statistical hypothesis test, using the 'goodness-of-fit' approach. In order to ensure the reliability of the analysis, a research volunteer interrater reliability testing was done on two of the reviewed videos. The results of the reliability testing were compared to the original results using Cohen's Kappa. In case of significant difference, the coding was adapted and the reliability testing repeated using two different videos.

2.1 Theoretical Framework

The research methodology is content analysis, which came in large part from the work of Alfred Lindesmith in 1931 where he defined the hypothesis known as "The Constant Comparative Method of Qualitative Analysis" (Glaser & Strauss. 1965), and upon which most other research regarding content analysis is based. This is not to be confused with a paper which Glaser and Strauss published in 1965, in which they suggest a new approach to qualitative data analysis. Weber (1990) defines content analysis as ". . . a research technique that uses a set of procedures to make valid inferences from text"(p. 9) but which appears to limit content analysis to textual forms. Here the word 'text' should perhaps be taken in the broader context as a form message, a definition Neuendorf (2002) uses without limiting the methodology to text per se, thus opening up the possibility of more broadly defined messages to media such as video and audio. It may be reasoned that oftentimes a video or audio message will be transcribed into text, and that Weber's (1990) definition is encompassing the media such as audio and video. Reitz

(2004) provides a much more elaborate definition of content analysis by making the procedures and tools used more explicit, “Close analysis of explicit and implicit messages of a text through classification and evaluation of key concepts, symbols, and themes to determine meaning and explain its effect on the audience”(p. 173).

This research specifically uses the quantitative method of content analysis which Holsti (1968) defines as "any technique for making inferences by systematically and objectively identifying specified characteristics of messages."(p. 608), whereas Berelson (1952) explains content analysis as "a research technique for the objective, systematic, and quantitative description of the manifest content of communication"(p. 220). Kerlinger (1986) defined content analysis as a method of studying and analyzing communication in a systematic, objective, and quantitative manner for the purpose of measuring variables. These researchers emphasize the aspects of the method as systematic and objective as their focus is quantitative content analysis, thus being more specific on how the data is to be gathered and analyzed, as opposed to the definitions given by Weber (1990), Neuendorf (2002), and Reitz (2004), which seem to focus more on identifying or inferencing meaning from text.

This research will illuminate best practices as defined by the YouTube content creating industry, or professional world of YouTube content creators, and used within educational YouTube videos, rather than originating from the world of academia. The reason for identifying best practices that have emerged within the industry is that development and changes occur at a more rapid pace than academia has the opportunity to research, document, and vet such best practices. To sum it up, the industry is more contemporary than academia, which is the result of the different roles and functions they fulfil within society.

Google's YouTube algorithmically categorizes certain videos into sections by determining the central topics in videos (YouTube [3], 2015). YouTube creates an auto-generated channel or section based on trending and popular videos. The auto-generated channel names start with a hashtag (#). This study will use the auto-generated channel #education as the source for communication with which to apply content analysis.

2.2 Content Analysis

For this study two videos per YouTube channel, which are found within the #education channel, are analyzed in order to capture a more reliable sample from the channel from which the videos are obtained. A total of 14 different YouTube Channels will be selected, bringing the total sample size to 28 videos.

The Pearson's Chi-Square will be used as a statistical hypothesis test. This test will evaluate the likelihood of differences arising by chance from sets of categorical data. Pearson's chi-squared test was devised in 1900 by Karl Pearson (1992) to evaluate the results of statistical procedures by referencing the chi-squared distribution.

The Pearson's chi-squared tests for a null hypothesis which asserts that the events observed from the sample have a frequency distribution which are within the margin of error of the hypothesized distribution.

Pearson's Chi-Square is used as a result of the small sample size of videos analyzed. The reason for the small sample size of videos is because of the coding work that has to be done. The process of coding for video content is iterative in nature as it will often be adapted, changed and added as the analysis of the video content proceeds. This has to be done in order to ensure maximum compatibility with academic standards and integrity, and in particular those of from

the art of oral communication in public context or public speaking. This results in analyzing video content being a very time consuming process,

2.3 Analysis

The initial research did not establish the value for a given variable, for example, whether a citation density of 3 per minute was considered to be high or not. The objective was to discover by observation what may have been considered to be low and high quantities of the observed variables as defined by the industry. As such it would be prejudicial to have assigned numerical values to the variables 'low and high.' Instead a value of high or low was assigned based upon the observed quantitative results of all the analyzed content.

A set of variables was nominally measured and have been identified as potentially having an impact on the the viewer's ability to take in information, the message communicated by the video, and the audience of educational YouTube content. Based on captured variable data from the educational YouTube content, the subsequent results and analyses of said results have lead to a better understanding and potential identification of best practices of one or more of the observed and measured variables. The following set of variables within educational YouTube content was measured and analyzed.

2.3.1 Video frame cuts

Audience attention span has been reduced over time as a result of the increasing use of the internet as well as mobile technology, primarily in the form of smartphones and tablets. In 2013 the average user's attention span was 8 seconds, down from 12 seconds in 2000 (Gausby, 2015). Gausby's report issued by Microsoft concludes that there is intense competition for attention, but that audiences are also becoming increasingly proficient at simultaneously

processing information from different sources. Their advice is to keep messages concise, to the point, personal, to be interactive, and use a lot of movement in the message conveyed.

A video frame cut is a type of film transition which is made in post-production and involves attaching two separate scenes or shots that are combined, albeit often a minimal change, forcing a viewer to refocus and re-engage with the video. It may be compared to the rule to do something unexpected or using humor when addressing an audience in order to keep their attention (Lamson, 2014; Toastmasters International, 2012). It will thus be useful to see to what extent cuts are used to keep the attention of the audience focused on the video content.

2.3.2 Citation density

Traditionally academia places a major emphasis on citations and references as it establishes credibility in the writer's work, as well as giving other the opportunity to verify one's sources. Another reason for academia to emphasize citations is giving credit to those who originated the ideas upon which a new idea is based (Texas A&M). Through observation it may be revealed whether the industry follows, broadly, the same line of reasoning regarding establishing credibility through a high citation density.

2.3.3 Full screen visual aids

A full screen visual aid helps the viewer focus attention on the visual aid, while the presenter or narrator might explain something within or about the visual aid. Full screen visuals aid can be still images (fixed), or animated, and can assist in illustrating complex pieces of information. By measuring the frequency of full screen visual aids per minute it is possible to measure how often the content creators wish the audience to focus on the visual aids, or believe that the audience should focus on the visual aids. Full screen visual aids used for transition

purposes are also included, and will be counted towards the total number of full screen visual aids appearing in the video.

2.3.4 Partial screen visuals aids

Besides full screen visuals, much educational YouTube content also employs the use of visuals aids on the side. This means these visual aids do not utilize the entire screen, and often appear on screen together with the presenter or host of the show. The partial screen visual aids can be stills images as well animated visual aids within the video content. The visual aids often are simplistic in nature and used as enhancers, such as showing the name of a chemical or the portrait of a historical figure that is verbally mentioned. Partial screen visual aids are measured per minute. It is possible for multiple partial screen visual aids to be on screen during the same time. It is also possible that a partial screen visual aid appears on screen while another partial screen visual aid is on screen. These should all be counted as individual partial screen visual aids.

2.3.5 Presenter & Narrator

Whether a piece of educational YouTube content is presented by means of a presenter or host, or by means of narration, will be determined per video. This determination will be made based on which of these have the estimated majority of screen time, so exact timing will not be done, as these are not useful for this research. As a researcher I have observed much YouTube content and perceived that YouTube content has a clear presenter or narrator. It is, however, hypothetically possible to have a near even split between narration and a presenter, yet it is improbable.

The interesting part of these results will, in part, be what the viewers prefer -- presenter, or narrator -- as the channels have been chosen based on popularity. This is, however, only one factor in what might make a successful educational video.

2.3.6 Ambiguity

Ambiguity within the context of this research refers to the degree of certainty that is provided within the video regarding the topic or subtopic discussed. Ambiguity is perceived a difficult term to accurately define. It is often associated with vagueness, but pertains to a degree of certainty, or uncertainty, within any given situation. Ambiguity can be described as ". . . those situations where the information available to the decision maker is insufficient to form a probabilistic view of the world" (Amarante, 2014, p.1).

The objective of measuring this variable is to determine how long content creators keep their audience in relative suspense. The degree of certainty is measured per minute. Within the timeframe of 60 seconds both certainty and uncertainty can be given by both answering a question, and raising a new question for example. The degree of certainty per minute is determined by whether either certainty or uncertainty has the most time within that minute.

2.3.7 Request for interaction

A request for interaction means to actively engage with the audience as well as to request them to directly or indirectly respond. Within the scope of this research, requests for interaction may be as simple as asking to subscribe to the channel, like a video, or comment on a video. However, they could also be more elaborate as in requesting to meet at an event, or submit photos or videos.

2.4 Channels reviewed

2.4.1 Criteria

From YouTube's Education section, a selection of YouTube Channels has been made which adhere to the criteria that are set up for this research study. The content has to be made for online video distribution (in common vernacular; 'it has to be made for YouTube'). A lecture or classroom recording does not qualify. The total length of a video has to be within the timeframe of 10 minutes. The actual video can be shorter, as sponsorship messages, and closing credits or links to other videos may be included. The following YouTube Channels have been selected based on the aforementioned set of criteria:

SciShow: https://www.youtube.com/user/scishow/featured

The Slow Mo Guys: https://www.youtube.com/user/theslowmoguys/featured

The Brainscoop: https://www.youtube.com/user/thebrainscoop/featured

Vsauce: https://www.youtube.com/user/Vsauce/featured

Mental Floss: https://www.youtube.com/user/MentalFlossVideo/featured

Film Riot: https://www.youtube.com/user/filmriot/featured

SoulPancake: https://www.youtube.com/user/soulpancake/featured

Big Think: https://www.youtube.com/user/bigthink/featured

Mark Kulek https://www.youtube.com/user/Gifukids/videos

Veritasium: https://www.youtube.com/user/1veritasium/featured

The Ukulele Teacher: https://www.youtube.com/user/TheUkuleleTeacher/featured

Khan Academy: https://www.youtube.com/user/khanacademy/featured

Numberphile: https://www.youtube.com/user/numberphile/featured

AsapSCIENCE: https://www.youtube.com/user/AsapSCIENCE/featured

2.4.2 Interrater reliability testing

The primary concern of interrater reliability testing is to test the accuracy of content analysis by the researcher. In order to confirm whether the original content analysis has passed the interrater reliability test, it has to pass a percentage agreement. There is always the possibility of chance agreement, but this is more likely with two coders, as well as with few degrees of freedom when it comes to coding categories. For example, with binary options, s the interrater has a 50% chance to "guess" the right answer. Cohen (1960) remarked on percentage agreement that "It takes relatively little in the way of sophistication to appreciate the inadequacy of this solution"(p. 38). Even though Cohen's 1960's criticism of the percentage agreement that there will always be a possible chance agreement was in the 1960's, researchers and scholars have noted that this problem still seems to persist within content analytics and interrater reliability testing (Hughes & Garrett, 1990, Kolbe & Burnett, 1991).

There are several statistics that take this chance agreement into account and try to correct for this. Hughes and Garrett (1990) reviewed and described multiple approaches to correct for this chance agreement. An often used approach is "Krippendorff's alpha" (Krippendorff, 2012). This method of interrater reliability adjusts itself for small sample sizes, seemingly making it well suited for this research, as it relies on a small sample size (n = 28). However, Krippendorff's alpha needs at least three or more interrater reliability coders. Cohen's Kappa (1960) is often used to test interrater reliability, testing whether variables measured in a study have correct representations. Cohen's Kappa is not reliant on a minimum number of interrater reliability testers, allowing for variability of research group participants. Cohen's Kappa uses at least two raters and compares data across a larger number of instances for reliability. It does have its limitations. For example questioned within the field of medical sciences whether the suggested

interpretation by Cohen is too lenient for medical tests and analyses (McHugh, 2012). However, as this research does not involve sensitive data, and results requiring narrow margins of error like in medical science, Cohen's Kappa should be sufficient to address the interrater reliability.

The formula used for Cohen's Kappa is;

$$\kappa = \frac{p_o - p_e}{1 - p_e},$$

Where:

P_o = Observed percentage of agreement,

P_e = Expected percentage of agreement.

2.4.3 Researcher Reflexivity

Researchers are humans, they naturally hold biases which are formed by their experiences throughout life, shaping their attitudes and beliefs. Despite good intentions these biases can seep into and color their research and its results. These biases can be from the fairly obvious to the subtle, and barely noticeable. Stephen Jay Gould (1996) investigates racial biases in science from the late-1700 until 1950's history in biology and evolutionary theory by pointing out that researchers held beliefs and prejudices that shaped their research. He illustrated this by looking at the research methods used and the results they produced. Stephen Jay Gould made it clear that researchers often had a racial prejudice, believing that black people were inferior and had smaller brains. The results subsequently supported their prejudice as they unconsciously steered the research in this direction.

What Stephen Jay Gould showed is that researchers throughout time have held beliefs that are reflected in their works. Even though we may have improved education on the subject matter of biases, beliefs, and attitudes, does not make us immune to them. Researchers have to

take care, re-evaluate, and reflect upon their works, their conclusions, and methods. Sometimes this re-evaluation can be done with the help of third parties, such as interrater testing.

Equally important is that others are able to investigate our results, as well as our beliefs and attitudes. This is, however, a difficult task unless the researcher is transparent about it in the research. It is thus that the researcher should disclose their beliefs and attitudes, as well as other relevant factors.

I admit to being an audio-visual learner, having discovered early in my education that I thus favor video over reading, or writing. I am an early adopter for many new technologies (Rogers, 2010), and have been for many years a frequenter of YouTube. Like most YouTube of consumers, prosumers (Toffler, 1980), and producers, I am subscribed to a multitude of YouTube channels, including some of the channels used in this research. After being a long time viewer of YouTube content, I have as of late been thinking of starting my own YouTube channel and creating videos of my own and with this going from being strictly a consumer of content to becoming a prosumer. Furthermore I tend toward a degree of technological determinism in my thought processes, and in solving problems.

2.5 Coding

2.5.1 Citations and references

Many references and citations are used within YouTube videos, some easier to distinguish than others. For this study a guideline was created to establish a comprehensive guide for understanding what is considered a reference or citation.

Direct references such as, 'according to . . .' or '[name] invented/ discovered/ created/ etc. . . .' are considered citations or references. Indirect references are more difficult to define as these are 'hidden' within the larger context of what is said. Often this piece of information is

specific to one person, location, or organization without reasonably being considered common knowledge. The date of an invention or discovery is considered knowledge being tied to the event of the discovery or invention itself. The date of an invention is thus for this coding considered a reference. Information that is not considered an indirect reference or citation are birthdays and holidays. Although a person's birthday or a holiday may not be known to everyone, it is not considered to be knowledge, in the sense that it was created. When one observes a reference or citation, it is counted as one. Citation density will be measured in citations and references per minute.

2.5.2 Video frame cuts

A video frame cut is any change within the video where two separate film fragments are directly connected, whereas originally there was another film segment in between. A video frame cut can be between two segments within the same environment, possibly even without the camera moving, or between two different locations and times. Any jump in scene, that is otherwise physically impossible is considered a video frame cut, and should be counted as such. Video frame cuts will be measured in cuts per minute.

2.5.3 Presenter and Narrator

A presenter is someone on screen conveying information or speaking to an audience. A narrator is someone speaking to an audience but not on screen while conveying information. For example, explaining or describing the actions or movements of an animal that is on screen. Speaking while showing a diagram, still image, chart or other visual aids would not be considered narration, as it shows similarities to the use of a PowerPoint slide. If a video relies

upon animation and the speaker or author is not visible, it is considered narration. Regarding the notation of how a video is represented in the data, this is as follow;

Presenter - 1

Narrator - 2

2.5.4 Full screen visual aids

Full screen visual aids are considered such when one could reasonably consider them as PowerPoint slide substitutes. This could also include a video fragment or an animation or animated GIF (file type, Graphic Interchange Format). It is not considered a full screen visual aid if the footage of the surrounding area is of where the presenter or narrator is thought to be, such as in nature. Instead, the video is considered to be narrated and full or partial screen visual aids would have to be placed on top or the narrated footage. For example, it is often thought that Sir Richard Attenborough is narrating while on location because he is also seen presenting on screen, at least for a short time. In actuality he most likely records the narration in a recording studio. His videos are considered narrated and if a visual would be placed on top of the nature footage that would be considered a visual aid, more accurately a partial screen visual aid.

2.5.5 Partial screen visual aids

Unlike full screen visual aids which cover the entire screen for the duration that they are shown to the audience, partial screen visual aids are shown on screen together with the presenter of the video. Partial screen visual aids are often on the side of the presenter, but could overlap the presenter. Partial screen visual aids could even, by means of acting on part of the presenter, suggest interaction between presenter and partial screen visual aid. For example, a partial screen visual aid could be animated and ask the presenter a question to which the presenter responds, or

a partial screen visual aid could make a statement, reaction, or answer a question the presenter asks. Text and words are also considered images.

2.5.6 Level of ambiguity

Ambiguity was a fairly difficult variable to define with a set of rules and guidelines within the context of videos as the concept of ambiguity itself is quite abstract. In the context of this research ambiguity will be measured per minute in a binary, yes or no. The important question to determine ambiguity in a video is whether the host or producer provides closure, often in the form of an answer, in a given minute regarding a statement made, a topic being explored, or a question asked. Some examples of opening ambiguity could be, 'Why is . . . like this?', 'Before feminism . . . there was another important movement', or 'Let's explore what the properties of Cyclohexanone are'. If the ambiguity is not resolved and no certainty is reached within the minute it is measured then that minute is considered uncertain in regards to ambiguity. However, if certainty is reached in a following minute then this is considered to have achieved certainty. In case multiple questions or statements are made, opening up ambiguity, but not all are answered within the timeframe, then the average is determined. If the value is between 1.0 and 1.5 then that minute is considered uncertain, between 1.51 and 2.0 is considered certain.

2.5.7 Requests for interaction

Requests for interaction are measured per minute. A request for interaction within the context of YouTube is to seek a response from the audience. The request for interaction can be passive or rhetorical, for example, by asking the audience a question such as, 'How is it going guys/girls?'. An active request for interaction could be, 'What do you think? Please leave your

comments below in the comment section', 'Please subscribe to my YouTube channel', or 'Give that like button a click'.

2.6 Conversion of content analytics to numeric values

There are three types of Aristotelian speeches, namely; Informative speeches, Persuasive speeches, and ceremonial speeches. The latter is often referred to as entertaining speeches. Within this research, these speech types are used to describe the videos reviewed. The speech types will be converted to a nominal system;

Informative - 1

Persuasive - 2

Entertaining - 3

The level of ambiguity, represented by two variables, certainty and uncertainty, will be numbered nominally;

Uncertainty - 1

Certainty - 2

Requests for interaction is represented by a binary choice of 'yes', and 'no', nominally labelled;

No - 1

Yes - 2

2.7 Definitions

A channel; the homepage for a Google account on YouTube where a user can upload video content to the user account (Karch). The owner or owners can be reasonably considered the author or authors of said channel.

Author, or content creator; a person, a group of people, or even a production company or organization that creates content for online video distribution. An author or content creator may be referred to by their Channel name if this can reasonably be considered their alias too, or if primarily known through their channel name.

Educational video content; online video content with the main intent of transferring knowledge or information. Within the scope of this project only content categorized by YouTube within the education section is considered educational. This does, however, not mean there is no other educational content on YouTube, but merely not identified as such by YouTube.

3.0

Analysis

3.1 Descriptive Statistics

Within this research variables were measured on a per minute basis, which lowered the accuracy of results, as some variables are more sensitive to time than others. The following variables are considered metadata variables of videos, as these do not describe any attributes of content within videos; The length of time of the video, subscribers to the channel to which the video belongs, total video views of a channel, views of the videos reviewed, likes of the video, and dislikes of the video. The other variables that were measured are considered content variables. Content variables are; video frame cuts per minute, citation density per minute, full screen visual aids, partial screen visual aids, type of speech, presentation style, and requests for interaction. The data analyzed resulted in the following descriptive statistics,

Descriptive Statistics					
		Time in Minutes and Seconds	Subscribers	Total Channel Views	Views on Reviewed Videos
Total	N	28	28	28	28
	Mean	0:05:05	2,287,206.57	250,764,124.93	838,418.79
	Median	0:04:54	1,429,823.00	149,606,018.50	120,358.50
	Range	0:05:25	8,891,543.00	815,573,213.00	4,615,246.00
	Std. Deviation	0:01:28	2,353,101.938	242,271,846.059	1,431,091.306

Descriptive Statistics				
		Likes on Reviewed Videos	Dislikes on Reviewed Videos	Speech Purpose
Total	N	28	28	28
	Mean	18,304.71	500.68	
	Median	2,815.00	122.50	
	Range	104,695	4,572	
	Std. Deviation	30,349.898	938.939	

Descriptive Statistics					
		Presenter, or narrator	Cuts per Minute	Citation Density per Minute	Full screen visual aids
Total	N	28	28	28	28
	Mean		6.8772	2.1273	2.5288
	Median		6.8750	2.0375	2.3095
	Range		21.75	6.80	9.38

	Std. Deviation		4.53895	1.67940	2.14092

Descriptive Statistics					
		Partial screen visual aids	Visuals are Animated or Static	Level of Certainty	Is the host/ video requesting interaction with the viewer
Total	N	28	28	28	28
	Mean	1.9854	1.3013		1.25
	Median	.5476	1.0000		1.00
	Range	12.25	1.33		1
	Std. Deviation	3.52702	.41101	.3951	.441

Table 1 - Descriptive statistics

The mean and median for the duration of videos is observed close to five minutes with a range of 5:25 varying from 2:45 - 8:10. Despite the small sample size of the duration of videos, these appear to show an even distribution.

From the 14 reviewed channels, four channels had less than one million subscribers, while three channels had between one and two million subscribers. Two channels had between two and three million subscribers, one channel had between four and five million as well as one channel having between five and six million subscribers. The last channel has a subscriber count over eight million. The difference in subscriber count relates strongly to other metadata variables such as views, likes, and dislikes, showing that with an increased subscriber count comes a linearly increased count of views, likes, and dislikes.

Analyzing the descriptive data, a trend emerged showing an increased number of video frame cuts at the beginning (minute 0-1) in 18 out of 28 videos based on the mean of video cuts of each individual video. The ten videos that did not show an increased rate of video frame cuts in the first minute, two videos showed no video frame cuts at all. In case of YouTube content, content creators often add some promotions to their content, referring to other videos they made,

and sometimes to other channels they maintain. This self-promotion usually appears in the form of a fixed screen with few or no video frame cuts, and thus decreases the number of video frame cuts observed in the last minute of the video. Another component that influences the number of video frame cuts within the last minute is the accurate time of the video. The data suggests that the number of video frame cuts towards the end of videos increases in 13 of the 28 videos.

The majority (16) of videos did show entertaining elements such as jokes, cartoon elements, humor, or word-plays. Seven videos did not appear to use any elements of entertainment, and five videos predominantly showed signs of persuasion. All videos included informative content, but differed in speech type. The data showed that of 28 videos, 23 used a presenter for delivery type, the remaining five were delivered via narration. The narrated videos were all presented by men. From the videos with presenters 19 were performed by men, whereas four were presented by women.

3.2 Pearson's Chi-Square Statistics

All the variables were cross-referenced against each other utilizing the IBM's SPSS (v20) CrossTabs analysis tool, and choosing Chi-Square. This means that Chi-Square was used on 'time x subscribers', 'time x channel views', etc., continued with 'subscribers x channel views', etc. Whenever a sample size between two categorical values with expected cell sizes of 5 or less was analyzed, SPSS (v20) defaulted to using Fischer's Exact statistical calculation in favor of the Chi Square Test. Fischer's Exact Test produces an exact P-value.

A result, be it a Fischer's Exact Test or a Pearson's Chi-square Test of Independence, was considered significant when a result value of .05 or less was observed. This means that an observed value had to be between .00 and .05. However, as the data analyzed needed to be nominalized for the Chi square test or Fischer's exact test in case of small values sizes, the

results are less exact than when a numerical test was used without nominalized data. For this exploratory study it was, however, more relevant to obtain indications of relevance rather than maximum accuracy of significance.

Strong correlations with a high degree of significance were observed between metadata variables of videos except for the duration of the videos. No significant correlations were observed between duration of videos and other metadata variables. The range of high significance between correlations with Fischer's Exact two-sided test between metadata variables, excluding duration of videos is; .000 - .007.

Strong correlations with a high degree of significance were found between the following variables;

Fisher's Exact Test:	Exact Significance (2-sided)
Time and Dislikes	.054
Presentation type and Video frame cuts	.044
Video frame cuts and Partial screen visual aids	.021

Table 3 - Strong correlations with high degree of significance

	A symp. Significance (2-Sided)
Video views and Speech Type	.049 (Pearson's Chi Square) .039 (Likelihood ratio)
Likes and Speech Type	.049 (Pearson's Chi Square) .039 (Likelihood ratio)
Dislikes and Speech Type	.007 (Pearson's Chi Square) .002 (Likelihood ratio)
(almost significant) Speech Type and Citation density	.069 (Pearson's Chi Square) .062 (Likelihood ratio)

Table 4 - Speech type

There seems to be a reasonable correlation between the duration of a video and the number of dislikes it receives. This correlation appears to be inverse, thus as the duration of a video increases the number of dislikes decreases. As seen in table 4, this correlation is not clearly

significant, and thus it should be seen as suggestive, or perhaps indicative, of what one might observe with a larger sample size.

It appears that there is a correlation between video frame cuts and presentation type. The correlation shows that videos with a presenter have more video frame cuts per minute on average than video that are narrated. A strong correlation between video frame cuts and the number of partial screen visual aids seems to be present.

Speech type appears to shows the highest number of significant and near-significant findings. Observations of data show that Speech type has a strong correlation with likes and dislikes, as well as citation density. There appears to be no favoring of a particular speech type compared to another speech type correlated to likes and dislikes. Likewise there does not appear to be a direct pattern between speech type and citation density. The correlations might have more to do with the particular content a channel creates and publishes, as opposed to a particular speech type favoring citation density.

3.3 Observations of data without prior tentative hypothesis

The data shows that 19 videos hold a preference for full screen visual aids compared to partial screen visual aids used in conjunction with the presenter on screen. None of the videos containing a higher rate of full screen visuals show a mean more than ten. Whereas three out of seven videos preferred partial screen visuals which show a mean more than ten. Out of the 28 reviewed videos, two had equal amounts of full screen visual aids and partial screen visual aids, thus not showing preference. The two videos that showed an equal amount of full screen visual aids and partial screen visual aids, had low median values (0.2 - 0.4), and were from two different channels. These videos had significantly less views than the other reviewed videos from the same channels, as can be seen in the following table;

Channel #	Number of video views	Median of Full screen visual aids	Median of full screen visual aids
1	2,629,952	0.4	0.4
1	4,617,648	0.75	1
2	109,719	0	0.67
2	27,334	0.2	0.2

Table 2 - Visual aid equality

The aforementioned channels were not the only that displayed significant differences in number of views. Other channels showed significant differences between views, however, these displayed no noticeable patterns in the relationships between full screen visual aids and partial screen visual aids.

4.0

Conclusion

4.1 Conclusions

No strong correlation between cuts and subscriber count, video views, likes, or dislikes, ambiguity, or requests for interaction was found in the analyzed data. In effect there were, sans two, no variables that showed a strong correlation with high significance in this exploratory study. This, however, might be in itself indicate significance. It could be hypothesized that the audience of educational YouTube content has a degree of tolerance for various combinations and degrees of variability of best practices, preventing this research from uncovering correlations using the Chi-Square test. These degrees of tolerance for combinations and variations of variables could be akin to Burke's Pentad or dramatism for public speaking (Burke, 1969). Despite the different approach this conclusion would be in line with the conclusion ten Hove and van der Meij came to after reviewing the most popular instructional videos; that users seem to appreciate a wide variety of physical characteristics in their videos (2015). The low significance of variable correlations was not entirely expected despite that the audience could well have a tolerance for a mixture of variables. A pentadic analysis approach might suggest that there are different patterns in how video characteristics combine even as the descriptive statistics reveal only the range of variation.

Based on the small sample size the range, mean and median of the video length seems evenly distributed, which is interesting, but perhaps not significant. It might, however, be worth investigating in future research whether there is a more ideal range of timing for videos. This could be achieved by sampling the most popular videos and investigating their time properties such as mean, median, and range. From the analyzed data of educational YouTube content

reviewed, there appears to be a pattern within the cutscenes of videos. The number of video frame cuts are generally higher at the beginning and the end of videos. This could possibly indicate that the videos reviewed might follow a similar pattern that is found in public speaking outlines, where in general the beginning and end consist of more and smaller components. There are two videos that showed zero video frame cuts as these were narrated and showed a continuous screen, and it may be argued that these could be removed from the equation. Nevertheless, the observation of video frame cuts at the beginning and end of videos does not show overwhelming evidence, thus it could be wishful thinking or merely a suggestion.

Observing the descriptive data of video frame cuts there appears to be evidence to support that not only the first minute of videos has more than the average video frame cuts but the second minute as well. 13 out of 28 videos have equal or more video frame cuts in the second minute. Although not conclusive, it may suggest that at least a part of the videos on YouTube is increasing the length of their introductory segment. This would indicate that these YouTube videos are assigning more time to their introduction than the 15% that public speeches traditionally assigned within the timeframe. Perhaps the instructional course of public speaking could after careful review of an increased sample size conclude to become more flexible in the rigidity of allotted time for introductions and instead allow a spectrum between 15% and 25% of a speech to be designated to introductions. Within this sample size there is no evidence to suggest that the minute before an increased video frame cut minute at the end of a video exhibit increased video frame cuts as well. This might suggest that YouTube videos have less focus on a traditional conclusion as seen in public oratory speeches, and instead use the body of a video to directly make conclusions. Furthermore, the results of this research regarding video cut frames might be different had they been measured per second rather than per minute. This would be an

important consideration for future studies. It would, however, be interesting to further investigate this hypothesis of whether the number of video frame cuts are more in the first and last minute than in the other minutes of a video. Furthermore, the high count of video frame cuts could also be done on purpose in order to retain the audience's attention. This may seem counter-intuitive as the rapid pace of video frame cuts might be perceived as distracting, yet it might only be distracting within the video, but still keep the audience more focused on it, and minimize distraction from their surroundings. According to Willingham "Change grabs attention . . . change topics, . . . or in some other way show that you are shifting gears, virtually every student's attention will come back to you, and you will have a new chance to engage them" (2009, p. 17).

The prevalence of entertainment within the videos and popularity of these videos suggests that this is important to audiences. In relationship to classroom teaching this may suggest that students could respond positively to more use of entertainment within the classroom environment. The suggestion could, however, also be made that there is an opportunity for the teachings of oral communication in the public context (public speaking) to educate students on ceremonial or entertaining speeches. From the 23 videos with a presenter, 19 (82.6%) videos were performed by men and four (17.4%) by women. This shows a reasonable consistency with Kim's findings of the differences between men (65 - 80.25%) and women (16 - 19.75) in publishing videos on YouTube (2009).

The not quite significant inverse correlation between speech type and dislikes could be explained as follows; users are more likely to try short videos, as more users might not like a particular short video. Users who watch a longer video are making a commitment to watch the video, and are more likely to not dislike a video as they have invested more of their time and with this convince oneself that it is a good video.

The fairly high number, comparatively to all other variables, of strong and near-strong correlations of significance involving variable speech type suggests that this may well be an important or influential factor for YouTube users to watch a video, and to like or dislike it. The least expected near-significant correlation was between speech type and citation density. The correlation trends towards informative videos having a higher citation density than videos utilizing entertaining elements.

The correlation between video frame cuts and partial screen visual aids is not entirely clear, as the use of a partial screen visual aids does not need a video frame cut. It might, however, be that both the number of video frame cuts and the use of partial screen visual aids are indicative of a particular style of video. This may be a combination of variables that people have a tolerance for.

4.2 Discussion & Limitations

Given the rapid pace of change, there are many open and unexplored questions that could be asked regarding YouTube. In order to keep this exploratory research focused and within a scope of what was reasonably achievable within the timeframe, many interesting aspects to study were omitted. This type of study is more time consuming than I thought. Initially I believed it was entirely my doing, and to a degree this is probably true. However, I discovered that ten Hove and van der Meij state that when they started their research, YouTube had changed its five-star rating system to likes and dislikes (YouTube, 2010). YouTube made this change in January of 2010. From this I conclude that I probably could have done a lot more work if I had made up my mind earlier in my graduate degree program. If I had known about the research of ten Hove and van der Meij it would most definitely have affected this research in a more pronounced way as I would have looked to it for guidance on this particular topic.

There are many aspects of engagement and possible best practices this study did not cover, such as; the mood or tone setting of the video, the host's emotional expression level, positive and negative valence of words within the video, or word count per minute. This study focused mostly on relatively easily quantifiable aspects of videos to create a foundation for potential future studies.

Another, self-imposed, limiting factor was that I opted to review videos labelled by YouTube under the #Education channel. This was purposefully done in order to limit potential arguments about what might qualify as educational. Ten Hove and van der Meij defined videos by their instructional type, a definition perhaps easier to operationalize (2015).

I considered analyzing the comment sections of reviewed videos for positive and negative valence. The decision was made not to include positive and negative valence of videos. Some video have requests for interaction. Responses to requests for interaction, however, do not necessarily require positive or negative valence, and in some cases the request for interaction is meant in a passive way, thus the video is not actually seeking responses but perhaps more a thought process. Furthermore, counting positive and negative valence of all comments presents the problem that not all valence is directed at the video and sometimes, in fact, is not related to it at all, instead the users have created separate interactions. It would thus be very hard to establish data of any meaningfulness.

The next step I might investigate in a future research project will be the influence of speech type on the likeability and viewership of videos. The sample was too small and skewed to give insight in the current project, but the value of Pearson's Chi Square result suggests that there could be an interesting interaction effect that might guide both YouTube practices and perhaps the teaching of public speaking.

5.0

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